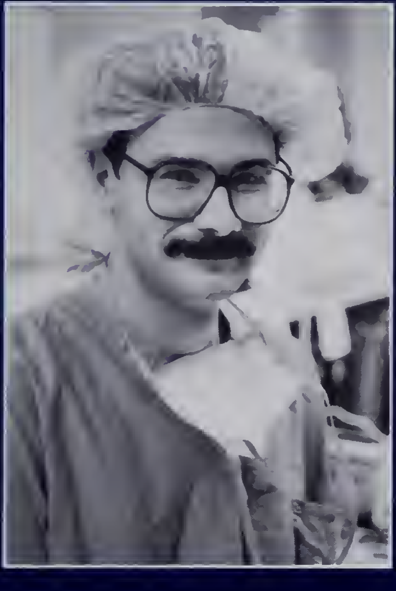
Columbia-Presbyterian Medical Center
Annual Report 1983

A Whole Life



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A Whole Life is a phrase that embraces many things, and all of them are the first concern of this, the nation's first and still foremost Medical Center. It means that we touch on every age and condition of life from conception to the declining years. It also means that we are deeply concerned with every aspect of people's lives: not just their illness but their good health, their family problems, their needs and fears, their economic difficulties, their feelings and their futures. And we are concerned with the larger issues that touch on people's lives and well-being: the welfare of our community and society, our dedication to high standards not only of care but of ethics and values, the search for knowledge, and our responsibility to coming generations of lives. Finally, and perhaps most of all, the concern of everyone at the Columbia-Presbyterian Medical Center is to help people make their lives healthy and "whole."

In this report we hope to show some of the ways in which we excel at this endeavor.

Transplantation Restores Quality Lives

Donor heart, a highly perishable organ, must be carefully tended and quickly transplanted.

Three years ago for reasons never determined, Bruce Neuberger was rapidly losing tone in his most vital muscle: his heart. It was becoming so flabby that it no longer could pump blood to his lungs to gather oxygen, and he appeared to have only a few days to live.

As breathing became more difficult for Bruce, he sought help in the New York area until his physicians referred him to the Transplant Service at the Columbia-Presbyterian Medical Center.

Physicians here now have the skills to recover an ever growing list of organs, and to transplant them with an ever increasing success rate, including kidney, heart, cornea and bone. They may soon be performing transplants of small intestine, islet cells from the pancreas to aid diabetics, bone marrow and perhaps some day, brain tissue to relieve such debilitating disorders as Alzheimer's disease.

Organ transplants, particularly heart transplants, fell out of favor for many years because transplant patients too often rejected their new organs. Drugs that kept the organs working without spurring rejection by the body's immune system had to be given in such large doses that they overwhelmed the patient's ability to fight off other infections. New drugs, particularly one called cyclosporine, which went into limited use at the Medical Center this year, have gone a long way in solving this problem and have dramatically improved the success rates of these operations.

Cyclosporine suppresses the immune reaction that causes organ rejection, without shutting down the body's defenses against other diseases. Scientists theorize that the drug interferes with the chain of command in the body's immune system. Two sets of white blood cells act together to destroy a transplanted organ: "helper" cells, which issue the signal to attack, and "killer" cells, which receive the signal and attack the organ. Cyclosporine appears to prevent destruction of the new organ by blocking the signal from the "helpers" to the "killers."

Between March 1983, when cyclosporine first went into use at the Medical Center, and February 1984, the drug was used on 15 patients. Its use has made high doses of drugs previously used unnecessary. While it is not a panacea, it is the most effective drug available to prevent rejection and lower the risk of infection.

Paradoxically, as transplantation techniques have improved, human donor organs have become harder to get. The shortage is critical. About 10,000 people are waiting for kidneys in the United States, for example. Only about 4,000 of them will get a new kidney this year, if ever. The Medical Center's transplant coordinators are working on many fronts to increase the availability of organs.

The ceremony that surrounds police escorts is an honor usually reserved for state occasions. When the Medical Center's recovery coordinators use a convoy, they are racing against the clock to make an urgent delivery of a precious, perishable cargo—a new organ for a patient who may be hours away from death. Once an organ is recovered, the clock be-

Surgical teams at Columbia-Presbyterian have given new hearts to more than 40 people so far.

gins to run. Organs—especially hearts—can be preserved for only a few hours once they are removed from the donor, so the success of the Medical Center's transplant program depends on communications and coordination. Instant response and predictability are essential.

When a donor heart has been removed and properly packed, the surgical team at the Medical Center is alerted that the organ is en route. Surgeons then begin working to coordinate the removal of the diseased organ with the arrival of the healthy one.

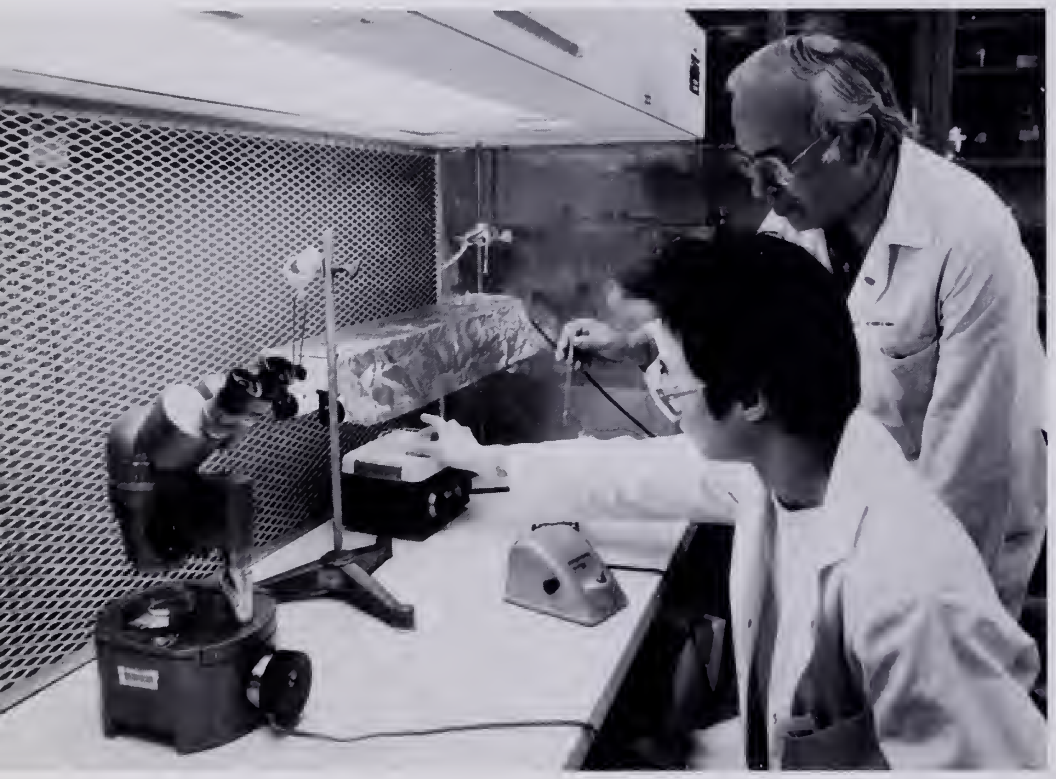
Members of the transplant team find that they are educators and counselors to families in grief as well. They instruct nurses and physicians on organ recovery and the medical criteria for organ donations. The public also is encouraged to recognize the need for organ donation.

Very slowly, there is growing an improved public awareness of organ donation. But there has yet to be a noticeable increase in donor referrals by physicians in the New York metropolitan area. In the meantime, laboratory efforts are aimed at improving the body's acceptance of those organs that are obtained for transplantation, as well as studying the use of tissues from other species for transplantation.

While kidney patients can live on dialysis until a new kidney is available, patients who need a new heart or liver can't wait.

Three years ago, for instance, when doctors told Bruce Neuberger that he didn't have long to live, he says, "I was so sick, I had to sleep sitting up

Kidney transplant patient Patrick Jones, 14, owes his life to anti-rejection drugs developed at CPMC. UV radiation of islet cells (below) is used by Drs. Mark Hardy and Henry Lau to prevent transplant rejection without drugs



in order to breathe and I hardly could walk.

"I had fooled myself into thinking I just needed a bypass operation to correct the problem. But when I was sent to the Medical Center, they told me I needed a heart transplant."

Six weeks after his admission, the North Babylon, N.Y. man went home with a healthy new heart. A week after his discharge, he was readmitted because of a rejection problem, and had to return to CPMC five additional times during his first six months after the surgery. His transplant had been performed before cyclosporine was used at the Medical Center. Today, rejection problems are handled on an outpatient basis.

Now, after almost three years with a new heart, Bruce's life is similar to that of any other 27-year-old man. He has a steady job, a steady girl, and he often meets his friends for a beer or two on a Friday night.

In his new profession, Bruce works as an electronic technician repairing medical monitoring equipment. He also plans to earn a degree in electronics.

Columbia-Presbyterian Medical Center is one of 18 centers in the United States where heart transplants are performed regularly. Doctors here have given new hearts to 41 patients through February, 1984.

Currently, 60 percent of the patients who receive heart transplants at the Medical Center can expect to be alive after one year. After five years the rate of survival ranges between 45 to 50 percent, and with the use of cyclosporine, it is expected to get even better.

While transplants are considered to be surgical procedures, an enormous amount of time is devoted to patient care before and after the transplant. The surgery could not take place without the support and help of the nursing and the medical staffs.

CPMC physicians no longer consider heart transplants experimental. They have become the accepted treatment for selected patients with end-stage cardiac disease who otherwise would die without a new heart. Once a patient is referred for a transplant, the staff determines whether a heart transplant is the best alternative. All patients are given a cardiac catheterization during their evaluation to determine the nature and course of their disease. Other diagnostic tests, including nuclear cardiology procedures, also may be used. In some cases, conventional treatment with drugs or open heart surgery is more appropriate than a transplant. Unless the patient's life is in jeopardy, the most conservative treatment is recommended.

If the doctors believe that a transplant is necessary, the patient will be "worked up" for surgery. The pretransplant work-up includes checks by dentists, who examine heart transplant candidates for mouth infections, which can become aggravated after surgery. Social workers routinely see patients and their families to help them cope with the problems that may accompany illness, their use of the Hospital and their post-hospital situations.

After surgery, staff nurses closely monitor the patients' recoveries. In the first weeks after surgery, heart transplant patients are kept in isolation and monitored 24 hours a day to guard against infection. Members of the Pathology Department determine if the patients are suffering from problems of organ rejection.

It is the nurses with whom the patients have the most contact and on whom they depend for everything from meals to medications to friendship and emotional support. As patients recover, nurses teach them how to control their diet and how to take and monitor their medications. By the time patients are ready to go home, they often have gained lasting friendships as well as a new heart.

"Everybody at the Hospital has treated me like gold," says Mr. Neuberger. "I know the people who took care of me well, and that makes me feel more comfortable when I come back for a checkup. The Transplant Unit is like my little family. Between the doctors, nurses and the man upstairs, I'm doing OK."

Transplant surgeon (left) depends on rush deliveries by Organ Recovery Coordinator (below)

Nutrition Saving Lives In the Hospital

There was a time when anybody undergoing surgery was of necessity going hungry. The requirements of many presurgical diagnostic tests, the danger of administering an anesthetic to a patient who has just eaten, and the many obstacles to regular food intake after surgery all meant that surgical patients had to go for a long time without food. Obviously this didn't improve the patients' condition approaching surgery nor did it aid recovery afterwards.

Then, of course, came intravenous feeding, mostly glucose and more glucose. This helped—but was still far from a truly scientific solution.

Today the feeding of surgical patients and others with major nutritional difficulties—such as way-below-normal-weight newborns—has become a highly refined discipline based on scientifically sophisticated basic research and a mass of clinical experience and observation. So has the nutrition of pregnant women and the newborn, especially those in difficulties.

At the Medical Center, which is an internationally recognized leader in the field, this is a result of a close collaboration between the Departments of Surgery and Anesthesiology, major involvement by the Department of Pediatrics and the Institute of Human Nutrition, and contributions from various other departments and divisions.

Work at this Medical Center, for example, has delineated the very intimate relationships between metabolism, nutrition and cardiorespiratory function. New instruments designed here can—for the first time—measure metabolic rate and gas exchange in surgical and injured patients who require artificial ventilation. From studies with such instruments, nutritional therapy has been carefully modified to provide optimal calories and nutrients and to "wean" patients off the mechanical respirator safely and more rapidly.

In the not-too-distant past, it was a truism that, "Death from starvation is frequently respiratory in origin." CPMC researchers and clinicians have largely retired that saying from use. They have "taken apart" the respiratory system into three main parts: a drive mechanism (the central nervous system), a pump (the respiratory muscles) and a gas exchange organ (the lung) and examined the influence of nutritional support on the function or failure of each part. They have made it clear, for instance, that nutrition in surgical or injured patients is not just a simple matter of calories and vitamins but a delicate question of how the nutrients influence metabolism and gas exchange.

The influence of nutrition on the brain's control of respiration is a crucial concern, especially when it comes to the administration of anesthesia. It is now obvious that the brain is affected to a much greater degree than previously thought by amino acids and other plasma substitutes used in conjunction with surgery and that changes in the brain's respiratory function are related to changes in the brain neurotransmitters. Not just incidentally, these studies have become useful in the investigation of basic brain physiology as well as the action of anesthetics and the affects of nutrition in surgery.

Much attention has recently been given to the dramatic changes in survival rate and health of extremely low

Low-birth-weight infant (opposite page) receives Total Parenteral Nutrition precisely tailored by Dr. William Heird (above)

Canopy give precise measurements of metabolic and nutritional needs

Basic studies of nutritional need are directed by Drs. Pedro Rosso and Sally Lederman

birthweight infants who would have died or survived with severe problems just a few years ago. Many advances in neonatal care have contributed, among them improvements in nutritional care, especially Total Parenteral Nutrition (TPN).

The revolution got its first impetus 15 years ago with the discovery that babies who could not be fed intravenously because of the damage it caused to their tiny veins could be fed through a catheter inserted directly into a large vein near its entrance to the heart. But the technique itself posed unacceptable dangers because low-birthweight infants couldn't tolerate high calorie feedings. This problem in turn was solved with a system that measures the infant's temperature, automatically adjusts the incubator temperature, and allows caloric load to be kept at a minimum because the infant uses fewer calories in the effort to regulate its body heat. Most significantly, physicians at the Medial Center have developed highly complex systems for measuring nutrients and other substances in very small blood samples for the necessary delicate analysis and adjustment of nutrition.

Now Medical Center scientists are focusing on a careful analysis of the differences between human milk and formula and seeking means by which the drawbacks of each may be counteracted. In the nation's only human milk bank devoted totally to research, they are seeking the fundamental knowledge and data that are necessary before the benefits and risks of human milk or formula for premature infants can be fully defined.

Beyond infancy, the nutritional problems of infants and children with a variety of health problems are being studied in the Institute of Human Nutrition's Clinical Nutrition Research Unit, the only such center in the country devoted to children.

The Medical Center also has the only training grant in the country to prepare graduate dentists for an academic career in the field of nutrition and dentistry.

Cancer: Promising New Treatments Emerge

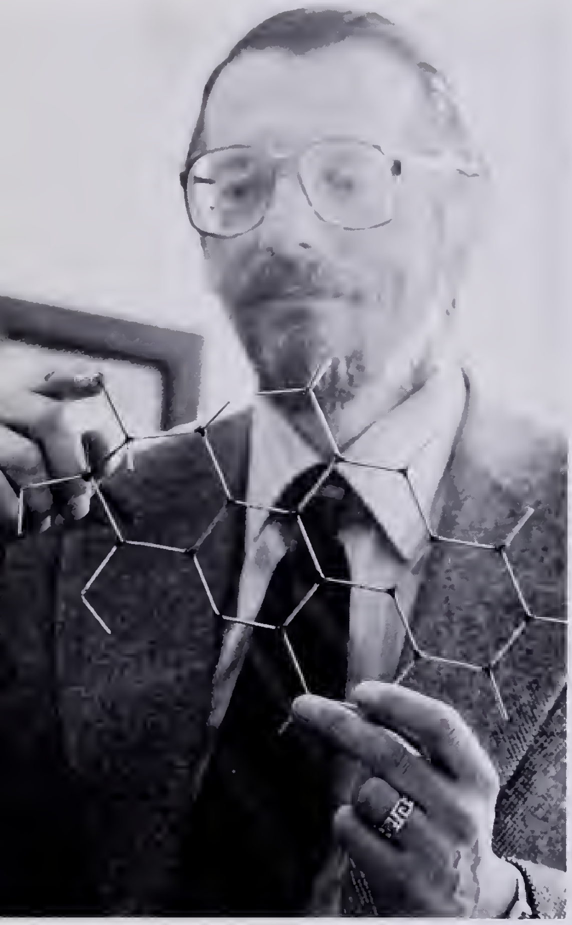
For centuries, surgery was the only way to treat cancer. Today, it still is the leading treatment when a tumor is present. But refinements of surgical techniques, and new therapies which capitalize on an increased understanding of the disease, have helped physicians close in on the causes and cures of many forms of cancer.

Cancer often is thought of as one disease. In fact, it is a large group of diseases, any one of which can invade normal tissue and grow uncontrollably throughout the body.

Cells in the body constantly die and are replaced. When a change occurs in the genetic message that controls cell replacement, the cell grows and replicates abnormally. These new, abnormal cells in turn divide. Cell division may continue until the entire affected area becomes a mass of tumor.

If malignant tissue is detected and diagnosed early, the likelihood of cure is good. Doctors at Columbia-Presbyterian Medical Center have developed a variety of tests that can indicate whether or not any early cancer-causing changes have occurred. A major area of research involves cancer markers—tell-tale chemical signs of cancer that can be traced.

One such promising method of early detection is the use of monoclonal antibodies. When any foreign organism enters the body (for instance, a cold virus) it carries an antigen, or marker, which stimulates the production of antibodies that move in and attack the invader. The body



Molecular structure of environmental carcinogens is studied by Dr. I. Bernard Weinstein of the Cancer Center

manufacturers a different antibody, or defender, for every foreign cell that enters the human system.

Each type of human cell—even a cancer cell—also carries its own unique brand of antigens. The body normally will not produce antibodies which attack its own cells. But such antibodies can be engineered.

Laboratory-produced monoclonal antibodies are remarkably accurate in traveling directly to their targets. Physicians can attach drugs or slightly radioactive markers to the monoclonals, turning them into microscopic guided missiles. The monoclonals, laden with chemotherapy drugs or radioisotopes, haul their cargoes only to the sites where physicians hope they will damage the cancer cells or pinpoint the tumor's location.

Monoclonal antibodies are undergoing clinical trials in the diagnosis of breast cancer at the Medical Center. They also are being studied to see if they may be useful in detecting other forms of cancer and cancer-causing agents.

Researchers have identified about 30 chemicals that are known to cause cancer in humans, and laboratory studies of other substances are under way at the Comprehensive Cancer Center and the Institute of Cancer Research. Hundreds of chemicals have been found to cause cancer in laboratory models after repeated exposure. A great many cancers, in fact, are due to environmental factors—diet, lifestyle and exposure to dangerous chemicals.

At CPMC, researchers have developed a method to detect carcinogens bound onto DNA—the genetic material in all cells. This analysis, called an assay, can indicate whether any cancer-causing changes have occurred.

Monoclonal antibodies are engineered so that if there is no carcinogen in a cell's genetic material, the antibodies will not bind to it. If a cancer-causing agent is present, the antibody latches on and can be traced. Only now are scientists beginning to understand how carcinogens work, and are trying to provide lab tests to detect if cancer-causing substances are present in tissue and blood samples from patients.

Similarly, doctors at the Medical Center have developed tests that can detect the other by-products of cancers. If a certain protein made by the thyroid gland is present in a blood test, for instance, it implies that the patient has a malignancy. This test, first used here in 1977, almost totally has replaced routine body scans to detect thyroid cancer.

In the future, special testing may help doctors understand why a patient has cancer and may provide powerful methods for prevention, early detection and a guide to early treatment. Many advances toward this goal already have been made.

Virtually all of the Medical Center's departments play a role in the treatment of cancer, from the psychiatrists and social workers who counsel patients and families under stress to the nutritionists who prepare special diets for the patients. In fact, this Medical Center is one of only 21 in the country and one of only two in New York designated as Comprehensive Cancer Centers by the federal government.

The experts who have made the Columbia-Presbyterian Medical Center world-renowned in the field of cancer work in a city within a city spread over a score of buildings on 32 acres. But much of this expertise is now concentrated on a single floor: the new Ambulatory Cancer Center. The center is designed to keep the care of cancer patients as up-to-date, efficient, and above all, as convenient for patients as possible.

About 1,000 cancer patients now receive all aspects of their care, from chemotherapy to blood sample analysis and follow-up at the same location, as outpatients, thus avoiding a significant amount of hospitalization. The aim is to disrupt their lives as little as possible while they are being treated.

The center has 10 treatment stations, 12 examining rooms, half a dozen consultation rooms, a nurses' station, office space where researchers can collect and analyze data, a complete hematology laboratory, a business office, and even a lounge with a small kitchen for patients and their families.

The facilities, however, are only a small part of a successful treatment program. Most of the major advances made in cancer have been the result of the cooperative efforts of specialists from many fields. The Center brings together on this floor an interdisciplinary service. Soon, specialists in psychiatry, radiotherapy, gynecology, general surgery and urology will collaborate there. The Center thus provides opportunities for much greater access to formal and informal consultations, the kind of interaction that leads to better care and better clinical research.

In addition to the Center's complement of doctors, the staff of 18 includes oncology nurses, social workers, lab technicians, researchers, registrars and receptionists.

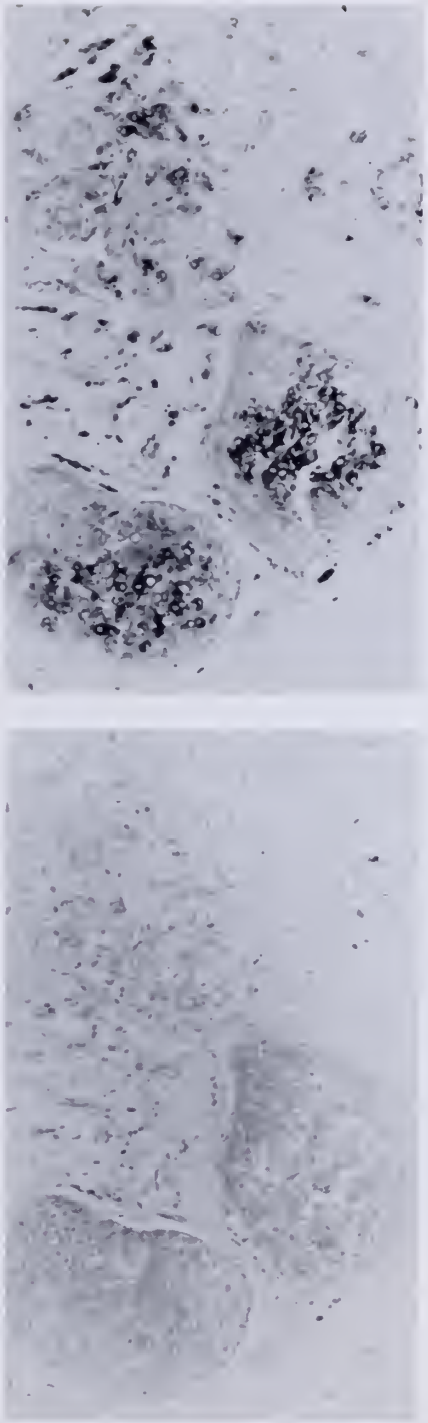
Since July 1979 many of the Medical Center's pediatric cancer patients have received much of their care in a similar setting: a pediatric day hospital, one of five in New York City.

Though the children who use the day hospital are seriously ill, with diseases ranging from solid tumors and cancer of the blood to sickle cell anemia and thalassemia, they don't have to be hospitalized for weeks or months for their treatment to be effective.

Instead, the young patients visit the day hospital from three times a week to once a month to receive treatments and have tests. Thus their progress can be monitored by their doctors in a relatively non-intrusive manner.

The 150 patient visits to the day hospital each week may be as short as 10 minutes for a blood test, or may last all day. But, when the treatments are over, the patients can get on with their regular activities at home.

A team of seven doctors, as well as nurses and social workers, is available around the clock to answer questions, provide emotional support, and, if necessary admit these young patients into the Hospital.



Blood test developed at CPMC reveals breast cancer antigen (above) compared to normal breast tissue

The medical staff at CPMC hold joint appointments at The Presbyterian Hospital, where patients receive care, and at Columbia University's College of Physicians and Surgeons, where cancer research is conducted. This link allows patients to benefit as soon as possible from state-of-the-art research achievements developed here and elsewhere.

Light:
Medical Applications Expanding

Today, the same beams of light that can burn holes through solid metal, guide nuclear missiles to their destinations or add a suntan to a summer vacation are being used to perform a variety of medical miracles.

The laser is but one example. At Columbia-Presbyterian Medical Center, the eyes have it . . . and the skin, the throat, the ear, the nose and the cervix.

One of approximately half a million Americans develop cataracts each year. Treatment involves implanting artificial lenses in the eyes to take the place of clouded lenses. Vision deteriorates in roughly 20 percent of these patients because opaque membranes form behind the implanted lenses. Until recently, an operation requiring anesthesia was the only means of removing the membranes.

At CPMC and a handful of medical centers around the country patients now are benefitting from the clinical introduction of the Nd:YAG (Neodymium Yttrium-Aluminum-Garnet) laser. Using the YAG laser, doctors cut away the membranes in a matter of minutes, without anesthesia, and on an outpatient basis.

Each of the patients experiences a marked improvement in their vision almost immediately. Doctors estimate that as many as 100,000 patients a year can benefit from this one application of the versatile new laser.

The YAG laser is unlike all other medical and surgical lasers. It does not burn; it cuts. It is, in effect, a new microsurgical tool. In the YAG laser, a garnet rod is used to generate light which is then concentrated by mirrors and dyes. The light is emitted in short pulses, each a millionth of a millionth of a second in duration. These pulses have a power so high that they produce tiny, 1/10th of a millimeter cuts. Other lasers produce heat and burn their target objects.

According to ophthalmologists at the Medical Center they have not yet begun to exhaust the possibilities of the new YAG laser.

In addition, the first medical applications of a new type of laser, capable of etching precise patterns so small that they could fit on a single human hair, are under development here.

Lasers are revolutionizing surgery of the eye (opposite page) and other organs and opening up wide new research horizons at CPMC

The new laser is capable of "heatless laser etching." The technique can produce clean-edged cuts in tissue, to a depth of as little as one-thousandth of a millimeter, without tearing or burning. The laser uses high-intensity ultra-violet light and is capable of breaking the atomic bonds in some materials—a process called ablative photodecomposition. As the atomic bonds are broken, the material vaporizes, creating extremely accurate etchings or "incisions."

Columbia-Presbyterian Medical Center and the T.J. Watson Research Center of the International Business Machines Corporation, Yorktown Heights, N.Y., where the process was first described, began joint studies of its medical applications. Based on studies with laboratory specimens, CPMC ophthalmologists are hopeful that the new laser eventually will be used in eye surgery for procedures such as corneal transplantation, reshaping of the cornea and removal of corneal scars.

Glaucoma is a condition in which excess pressure develops in the eye, damaging the optic nerve, which carries messages from the eye to the brain. Several million Americans suffer from the disease. For over a century, doctors have known that reducing this pressure can save the sight of their patients. Where medication is insufficient, surgery long has been used to relieve pressure within the eye. But now, in many cases, doctors have replaced their scalpels with beams of light.

The argon laser, which was developed at CPMC in 1968, has been used to treat the most common form of glaucoma—open-angle glaucoma—since 1979. In the past, doctors surgically created a new drainage system when this disease caused the old one to fail. Now, physicians can rejuvinate the eye's natural canals with the laser, eliminating the need for surgery 75 percent of the time.

The argon laser also has eliminated almost all of the need for surgery in the treatment of angle-closure glaucoma—the second most common form of the disease. In these patients, pressure builds up when the iris, the colored part of the eye, presses against the entrance to the eye's drainage canals. By creating a small hole in the iris with the laser, a process which in the past was done surgically, the pressure within the eye can be reduced quickly, on an outpatient basis.

The carbon dioxide laser, the work horse of medical lasers, is being used to treat neovascular glaucoma, a condition in which vessels grow over the eye's drainage system, causing increased pressure and eventual loss of sight. It once was inoperable. The carbon dioxide laser has been employed on thirty patients and it appears to hold the promise of salvaging some eyes that otherwise might have been destroyed completely by this dreaded disese. The procedure takes only about 15 minutes to perform. The conjunctiva, a thin sheath of material covering the eye, is pulled back. Then the laser is used to punch small drainage holes in the eyeball to release the fluids which have accumulated.

Another major cause of blindness is diabetic maculopathy. After 15 years of diabetes, even with the best medical care, about 70 percent of patients have some sign of this condition, and 15 percent go on to experience severe visual loss. Diabetes weakens the capillaries in the eye. The capillaries eventually leak into the macula, resulting in progressively blurred vision.

Until 1971 no treatment was available for these patients. Argon laser treatment for diabetic maculopathy now is 85 percent effective in stabilizing or improving the condition in selected patients.

The Columbia-Presbyterian Medical Center was among the first in the world to treat eye cancer with a new experimental technique called photoradiation therapy. The advance is one of the first new treatments of cancer of the eye in nearly three decades.

Eye surgeons who employ this therapy use chemicals and a special red dye laser to detect and destroy the tumor. Three days before the patient receives the laser treatment, he is injected with a chemical which collects in cancerous tissue. By the third day, the body's normal tissues have expelled the chemical. When the red dye laser is turned on, it quickly detects the chemical and destroys the tumor.

The laser is channeled to the tumor through a bundle of fiber optic strands, similar to those used in newer telephone cables, which surround the tumor and allow it to be attacked from several directions at once.

Medical Center scientists are using lasers, which can send powerful pulses of light of various wavelengths into tissue, for a wide spectrum of conditions. For example, lasers also are being used to treat precancerous growths of the mouth and the cervix.

For the past three years, otolaryngologists and dentists at CPMC have been using lasers to remove pre-cancerous growths in the oral cavity. Physicians don't know how long it takes for these growths to convert to cancer. In many cases with laser treatment there has been either no regrowth or no conversion to cancer. With such encouraging results, doctors may use lasers more in the future to *prevent* cancer.

Gynecologists use a carbon dioxide laser to remove venereal warts and pre-cancerous growths in the genital area. After determining by a Pap test and biopsy that pre-cancerous tissue exists, they either freeze the area or use the laser to remove it. The laser destroys less of the normal tissue around the pre-cancerous spot than other methods.

Dermatologists are using a cross between a 3,000-year-old skin treatment and a dose of modern technology to brighten the outlook for victims of a deadly form of cancer called cutaneous T-cell leukemia.

The ancient Egyptians discovered that teas made of wild carrots and fig leaves relieved some skin maladies, not even knowing that the active ingredients in these potions were psoralens, a group of chemicals which become active only when exposed to light. One kind of psoralen, called 8-methoxypsoralen, does a particularly good job of destroying malignant cells in a life-threatening disease called T-cell lymphoma.

Patients with this form of leukemia have abnormal types and amounts of white blood cells, which accumulate rapidly and invade many healthy tissues and organs. But since these cells circulate through the blood stream in darkness, a dose of this drug simply would float along with them through the body, useless and inactive. A technique called extracorporeal photopheresis not only overcomes this situation, but takes advantage of it.

Because psoralens work only when exposed to light, a technique has been devised to "switch them on" outside the body, away from most other cells. After giving the drug to a leukemia patient, the patient's blood is passed through an apheresis machine, which draws off two of its parts: the psoralen-carrying plasma and the white blood cells, some of which are malignant. The rest of the patient's blood is returned. The white blood cells then are exposed to ultraviolet light. The light "turns on" the psoralen, which binds to the harmful cells and inactivates them, without damage to any other cells. Ultimately, the psoralen is excreted.

The new treatment has been used only on a few patients, all of whom had been almost totally disabled by their disease. Since undergoing the treatments, which must be repeated like dialysis, most of the patients have returned to functional daily lives.

Newest heatless laser cuts precise notches in a human hair without "burning" or "tearing"

Surgeon Kenneth Forde and medical student use fiber optics for colonoscope examination

Tests showed that before treatment, more than half of these patients' white blood cells were malignant. After four months of psoralen therapy, the number of malignant cells was cut by 70 to 90 percent.

Psoralens also are useful in controlling another dermatological problem: psoriasis. Most people shed their top layer of skin and grow a new one every 36 days. In psoriasis victims, this process takes three days.

One important psoriasis treatment combines the use of tar preparations on the skin and ultraviolet light exposure. This treatment, developed 50 years ago, remains very effective. It usually requires a three-week hospital stay, but this has been cut to two thanks to an innovative, lower-cost "day hospital" for people disabled by the most severe form of this disease. During the third week, patients go to the Ambulatory Psoriasis Treatment Center for therapy only during the day; they can go home in the evening.

The Medical Center also was one of the first in the country to contribute to the development of another form of treatment: PUVA, or psoralens plus ultraviolet (A) therapy.

When stimulated by light, psoralens bind to the DNA in our skin cells. DNA is the genetic material in all human cells. When psoralens latch onto DNA, the cells cannot divide.

A series of treatments is necessary to slow down psoriasis. With PUVA therapy, about 25 to 30 treatments can control the disease. PUVA therapy is convenient for patients because it is done on an outpatient basis and is not as messy as coal tar salves.

Recent efforts have included the development of safer and more therapeutic methods of treatment. The effects of ultraviolet and visible light are being studied on patients and in research efforts. New types of medication that react with light for use in psoriasis therapy also are being developed.

Reproductive Medicine: Making Miracles

To new parents the arrival of a healthy baby is somewhat of a miracle. In fact, if the truth be known, it is still a miraculous event to most of the physicians, nurses, counsellors and other professionals who examine, test, advise, prescribe for and deliver the babies of the thousands of families who come to Columbia-Presbyterian for reproductive health care each year. It is also miraculous for the basic scientists who study everything from the causes of infertility and birth defects to the normal development of eggs and sperm, thereby greatly expanding our understanding of the reproductive process.

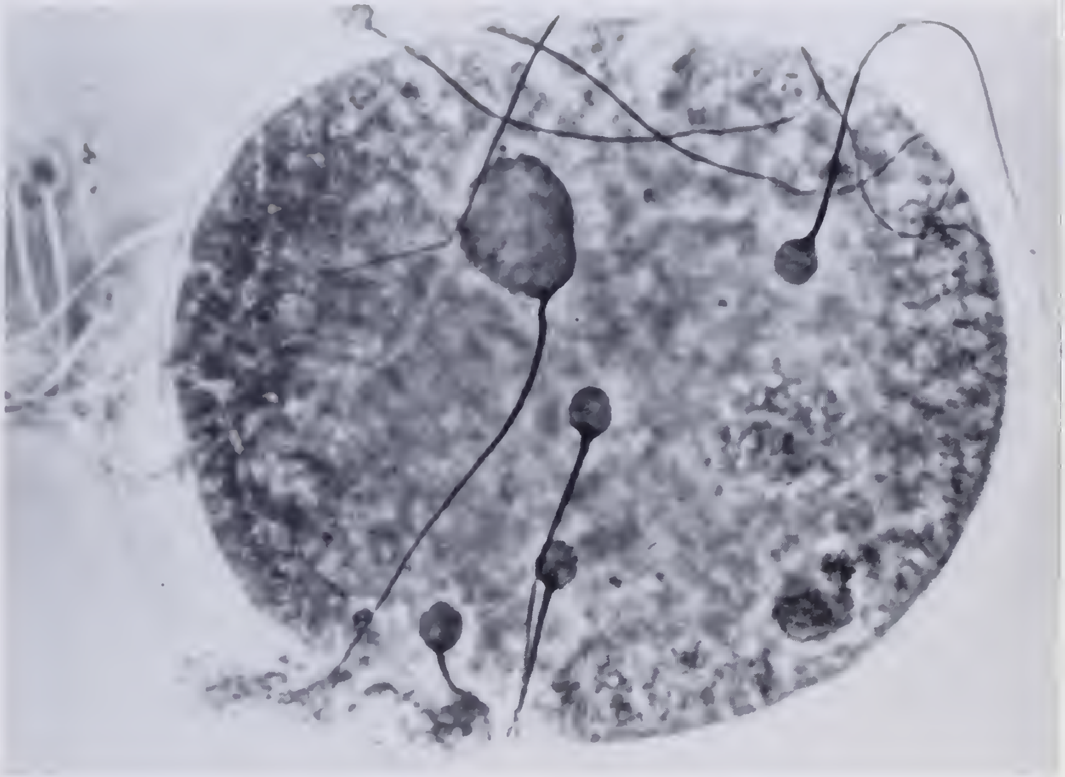
But it is perhaps most astonishing of all to the parents of a two-pound premature infant, a baby who in 1972 had only a one in three chance of survival and now has a 95 percent chance of going home. Or to the couple whose years of work to overcome sterility finally have been rewarded by the birth of a baby through *in vitro* fertilization techniques. Or to the husband and wife who watched their first child die before the age of 5 from Tay-Sachs disease, but, thanks to genetic screening and amniocentesis, could risk a second pregnancy and have a normal baby.

At Columbia-Presbyterian, major advances in treating infertility, monitoring pregnancy, evaluating newborns, caring for high-risk infants and probing the mysteries of genetic diseases have contributed to these miracles. So have the individual physicians and other professionals who guide anxious parents every step of the way. So have the students, both young and old, who have attended medical school courses, faculty conferences, continuing medical education programs, community lectures and individual counselling sessions. So have the departments, including Obstetrics and Gynecology, Pediatrics, Human Genetics and Development, Medicine, Public Health, Anesthesiology, Urology and the interdisciplinary International Institute for the Study of Human Reproduction. Their collaborative efforts culminate every day in the squall of healthy babies taking their first breath of life.

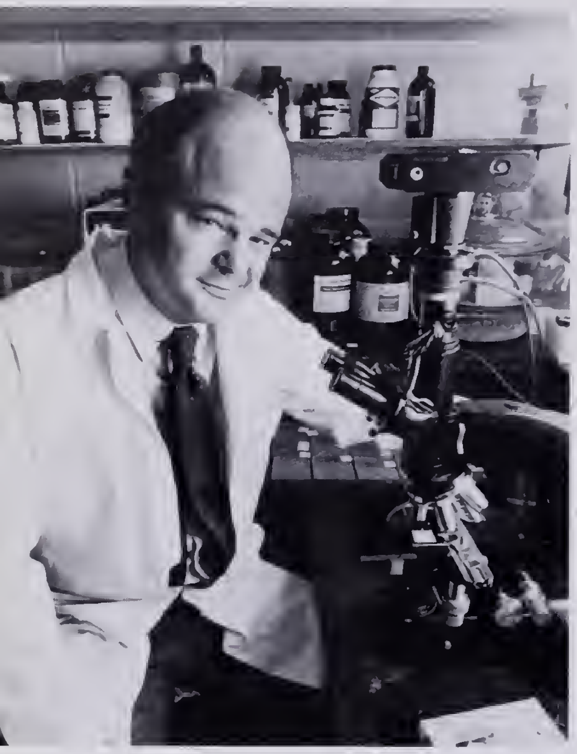
Last year was an exciting one in reproductive medicine and 1984 promises to be equally so.

The Medical Center's *in vitro* fertilization program was formally established in February of 1983, by which time it had already received 600 requests for applications. It is one of only two such programs in the greater New York area. By year's end 75 couples had been accepted into the program, designed for childless couples under 40 who cannot conceive for any of a variety of reasons.

The program offers participants a chance to work closely with the *in vitro* team in a most extraordinary effort to achieve a pregnancy. It also gives physicians a chance to observe at close range the early stages of human fertilization. Physicians monitor the woman's reproductive cycle to retrieve an egg from her ovary, fertilize it with her husband's semen in the laboratory and reimplant it in her womb. The process is complex and frustrating, but both patients and team members continue despite repeated setbacks. It is often the last



The miracle begins with fertilization of egg by sperm



Dr. Ralph deVere White, first director of New York Male Reproductive Center, directs graduate students in research studies (right)

hope for the patients, but just the beginning of what many physicians see as a new era in reproductive medicine.

Not only are new methods of conception now a reality, but truly futuristic methods of diagnosis and treatment for reproductive and fetal disorders are on the horizon. Gene replacement therapy, prenatal diagnosis and intrauterine medical and surgical correction of problems are among the remarkable advances being investigated or used by CPMC physicians and scientists.

Human clinical genetics is clearly one of the major frontiers today. Experts agree that knowledge in this area is about to explode, and the Medical Center will definitely be a part of it.

Currently clinical genetics activities at the Medical Center consist of major screening, counselling and education programs in most clinical departments.

In Pediatrics, for example, all newborns are screened, by state law, for eight disorders. In addition, the Department conducts screening for sickle cell disease, under the aegis of the newly established Sickle Cell Center, and for Tay-Sachs disease, muscular dystrophy and eye diseases. Children are evaluated for disorders arising from defective chromosomes or single genes, from exposure to environmental toxins or from other causes. Entire families are counselled for potential risk and careful follow-up is standard.

In Obstetrics and Gynecology, screening is done for mothers facing any of a variety of reproductive risks, such as advanced maternal age, a family history of birth defects, repeated spontaneous abortions or exposure to environmental hazards.

Laboratory services include analyses of chromosomes, of white blood cells, or bone marrow; biochemical diagnostic screening tests, and tissue typing. In addition, the Medical Center has outstanding molecular genetics research programs and one of only two labs in the East able to do prenatal diagnosis of sickle cell disease.

Since many stillbirths and infant deaths are the consequence of genetic disease, the Departments of Pediatrics and of Human Genetics and Development, and the Division of Epidemiology (in the School of Public Health) have collaborated in an ongoing study of fetal loss begun in

Dr. James Roberts uses recombinant DNA techniques to study structure and function of reproductive hormones

1975. This research has helped in counselling of women with repeated spontaneous abortions and with management of their subsequent pregnancies.

The establishment of a Clinical Genetics Center has been proposed to respond to the increasing scientific interest in clinical genetics and to prepare for a burgeoning public demand. The Center would combine the resources of the genetics clinics in Pediatrics and Obstetrics/Gynecology and coordinate care of patients referred to subspecialties. It would also establish new laboratory techniques that allow earlier and faster prenatal diagnosis and develop new diagnostic tests in collaboration with other researchers in the Department of Human Genetics and Development, the Cancer Institute and the Center for Reproductive Sciences. The program would also expand teaching activities, including education in the public sector.

Reproductive research at the Medical Center covers almost the entire spectrum of procreation, from sterility to successful and unsuccessful pregnancies to birth defects and normal births. Particularly significant work has been done on hormonal control of the development of eggs and sperm and the effects of maternal age on egg maturation. This research may eventually help to explain and perhaps offset the increased risk of Down's Syndrome for children of older mothers.

Molecular biologists in the Medical Center have been studying the genes that govern the hormones that direct reproduction, as well as the errors in gene expression that lead to fetal death. A gleam in the eye of young researchers is the hope that some day, rather than prescribe a hormone to correct a deficiency, physicians may be able to direct a patient's genes to produce the hormone in correct amounts, or replace a defective gene with a new one able to do the job effectively.

In the meantime, scientists continue trying to describe more precisely the control and action of hormones. What controls the menstrual clock, for example? How do hormones affect the brain, both male and female?

Whatever the latest frontier is, people at the CPMC are sure to be in the process of redefining it, all to better explain that final miracle, a healthy human infant.

Breathtaking Pace for Basic Research

Microscopic needle inserts purified genes into mouse embryo for basic research into mechanisms of heredity

Never before have scientists been better equipped—both technically and intellectually—to delve into the deepest and most hidden areas of life. Never before has the union between physics and biology seemed more fruitful. And never before has the accumulation of fundamental knowledge been so rapid and at the same time the distance between basic knowledge and clinical application been so narrow.

This year, there is a sense of excitement and urgency akin to that of the biological revolution of the 1950s running through all the laboratories in the Medical Center where basic research is conducted: the Departments of Anatomy and Cell Biology, Biochemistry, Human Genetics and Development, Microbiology, Pathology, Pharmacology and Physiology, and the Institute for Cancer Research.

It is no exaggeration to say that expectations are high for significant accomplishments and discoveries in many major areas. Among these are the study of the neurobiological basis of learning and memory (and also clues to such devastating conditions as Alzheimer's disease); the control and regulation of genes (and the diagnosis, treatment, and perhaps even prevention of sickle cell anemia, diabetes, and a host of other ills); the application of genetic engineering techniques in the understanding of disease processes (and thus in the diagnosing and treatment of cancer and many forms of disease); research on the dynamics of blood flow (a central issue in cardiovascular disease, hypertension, stroke and sickle cell disease); and the "explosion" in new techniques of imaging not just inside the human body but inside cells and even smaller components (with enormous potential for knowledge and use).

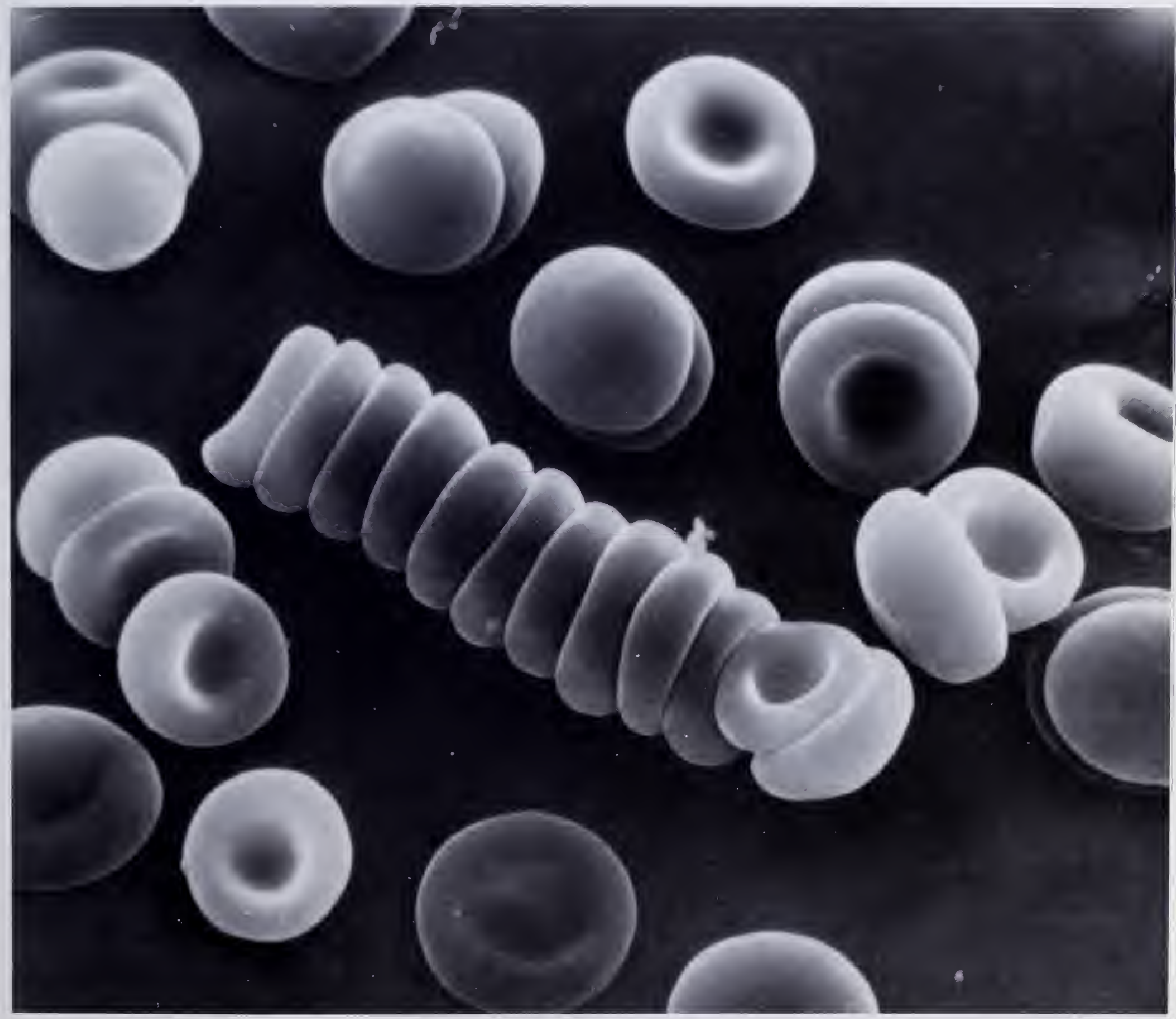
Underlying these expectations are two very solid bases. One is the accumulation of knowledge over the past several decades, which has proceeded more geometrically than arithmetically; the other is unprecented advances in technology that have provided techniques and tools for studies and experiments never before possible.

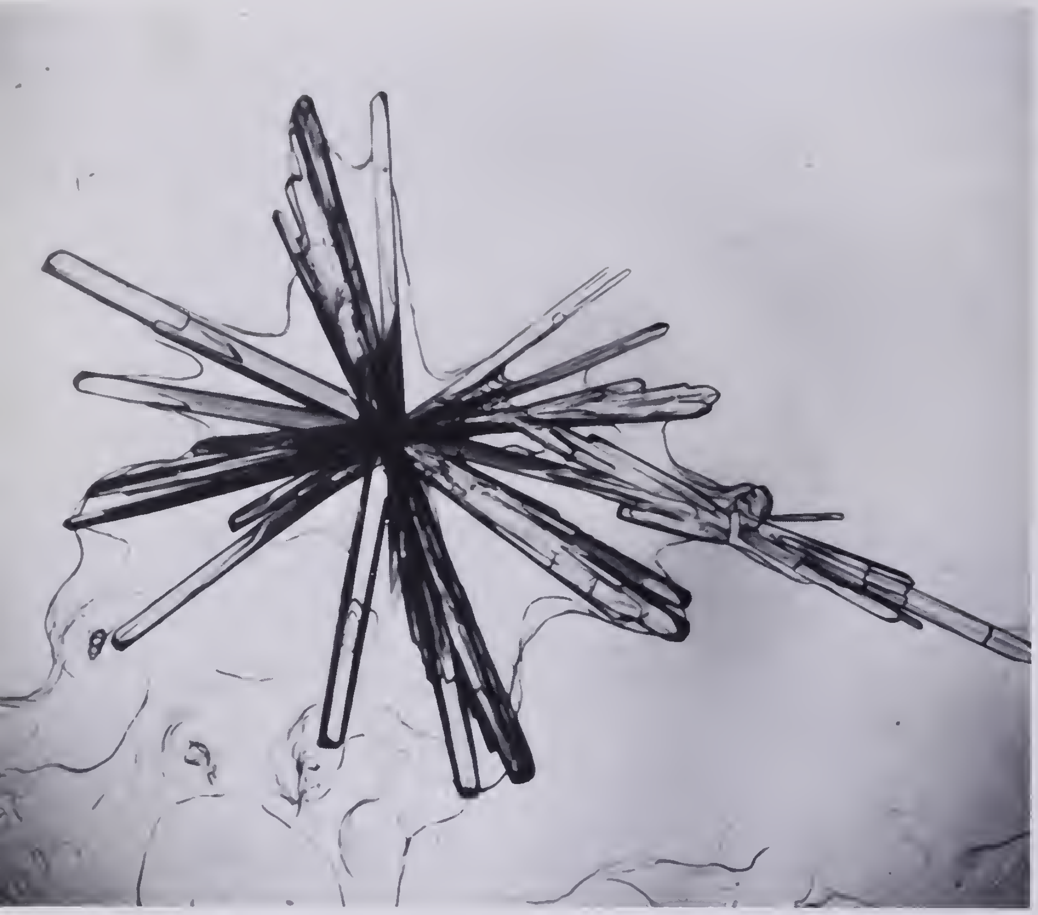
At the Medical Center, among the techniques and tools being used in pioneering ways are recombinant DNA (and for the first time anywhere, recombinant RNA); x-ray diffraction crystallography, computer-generated graphics, nuclear magnetic resonance, and many others.

In the past year, among many significant advances, were these:

Genetics researchers have developed a technique by which carefully selected and purified genes can be microinjected into one-cell mouse embryos where they often become a permanent and stable part of the chromosomes. When these eggs are implanted into "foster mother" mice, some of them develop normally into live mice which carry the injected gene in all of their cells and transmit

Microsieving apparatus with hair-thin tubes (left) allows researcher to study pressure on blood cells. When blood does not flow well, cells form rouleaux (below) which differ from clots





Co-crystal of the antiobiotic gramicidin and fat is studied to find out how such drugs act on cell membranes

them to future generations, so that permanent strains of genetically modified mice can be derived. This ability to place new genes into organisms and have them function correctly has powerful implications for biology and medicine. Among vitally important studies using this technique at the CPMC are those directed toward the understanding of the genetic control of insulin synthesis in man and, ultimately, to strategies for the control of diabetes.

A highly sensitive method of study called "microsieving" was developed and is being used to study the deformities of red and white blood cells that contribute to clotting diseases and several hematological disorders including leukemia. Investigators are pinning down such vital details as the different contribution made by proteins or lipids to the flexibility (or lack of it) in blood cells, which determines how well the blood flows through capillaries; and the effect of blood pressure variation on the inner walls of the vessels, with major implications for an understanding of the link between hypertension and cardiovascular disease.

Using the most advanced biophysical methods, and concentrating on the connection between structure and function, other scientists are reaching down to the molecular level to examine such disparate substances as proteins, viruses, lipids, bacteria, antibiotics, bile acids, carcinogens, enzymes and cobra venom. Some of their work has finally solved the underlying structure of a number of molecular complexes such as viruses. Other major concentrations are on such questions as how living organisms respond to light, and what biophysical mechanisms are involved in biological transport systems.

While these scientists investigate molecular structure, others concentrate more on cell function, such as electrical and ionic conductance, measurement of fluorescence, and the hydrodynamic properties of fluids and cells.

Other scientists have developed and patented new methods of introducing virtually any gene into cultured animal cells, techniques that allow a much closer look at gene function and regulation. They may also advance research on the replacement of defective genes by normal ones and also provide a powerful new tool for producing commercially valuable proteins not suitable for growth by other methods.

Gene splicing using RNA rather than DNA—a method that scientists have been trying to develop for well over a decade—was achieved at the Medical Center during 1983. The method promises to have advantages over recombinant DNA in certain uses and is expected to be a particularly valuable tool for research.

Whatever useful applications may emerge from these studies, the work of the basic scientist at the Medical Center always accomplishes its most fundamental purpose: to enlarge mankind's knowledge and understanding of life.

Studies Underway to Stop Heart Attacks and Prevent Sudden Death

Although we now know that the goal of preventing coronary artery disease is achievable, the fact remains that 550,000 people each year suffer from fatal heart attacks in this country. Many who survive heart attacks subsequently fall victim to sudden cardiac death caused by arrhythmias (potentially lethal irregular heartbeats) resulting from their heart attacks.

Treatment of heart attack and its consequences is a major part of CPMC's total effort to combat cardiovascular disease.

As a result of steadily improving methods of treatment, in particular advances in treating electrical conduction problems within the heart that are associated with heart attack, the death rate in hospitalized heart attack patients was reduced from 35-40 percent to less than 20 percent over the course of the last 20 years. Within just the past four years, however, the whole outlook on the mangement of heart attack patients has changed dramatically.

Previously, physicians concentrated their efforts on the consequences of heart attack—for example, how severely the heart's ability to function had been affected. Today they actually can intervene in the process of heart attack and can mitigate the severity of its outcome, thereby increasing the survival rate.

This new approach is possible because of research which demonstrated that heart attacks are precipitated by the formation of clots which block partially occluded arteries, and that heart muscle thus de-

First line of defense in heart attack is often CPR (cardiopulmonary resuscitation). Columbia is nation's only medical school requiring all students to learn CPR

Immediate therapy is vital to save victim of cardiac arrest

prived of its blood supply takes several hours to die. At about the same time, potent new clot-dissolving agents—in particular the enzyme streptokinase—became available and techniques were evolved to introduce them directly into the coronary arteries to dissolve the clots.

CPMC cardiologists and basic scientists have contributed important new knowledge which now is being used to test the feasibility and efficacy of this promising new approach. Physicians in our Adult Cardiovascular Laboratory were among the first in the country to use these new clot-dissolving agents to stop heart attacks in progress. Because of our wide experience with these agents, and because of our reputation for excellence in the area of coronary artery disease, CPMC has been selected as one of only five centers nationwide to participate in the full range of a new study which may lead to more widespread use of these drugs at smaller community hospitals (or perhaps even by emergency medical technicians).

The study will address itself to three basic questions: What is the best drug to use? What is the best way to use it? And which patients will benefit most from the new therapy? The study, funded by the National Institutes of Health, promises to have enormous impact on the outlook for heart attack victims everywhere.

To date, the drug most widely used has been streptokinase. Effective though streptokinase is, it can produce undesirable side effects. For example, as a foreign protein, it can provoke allergic reactions. Also, it is a nonspecific drug and affects the body's entire clotting mechanism, sometimes causing bleeding problems.

Very recently another clot-dissolving agent, TPA (Tissue Plasminogen Activator), has received FDA approval as an alternative to streptokinase. Because TPA, a product of genetic engineering, is a duplicate of the body's own anti-clotting substance, in theory at least, it should not cause any deleterious side effects.

The question of how the drug is to be administered is critical. A drug that could be given intravenously would be ideal because it could be given virtually anywhere, whereas intracoronary administration requires sophisticated facilities and specialized expertise.

The fact that CPMC has been selected as part of this major new study is a tribute to its excellence and to its continuing commitment to the fight against heart attacks.

Sudden cardiac death kills 400,000 Americans each year and is a major health problem in our society. Although sudden cardiac death commonly is confused with heart attack and frequently occurs in patients who previously have had heart attacks, it is not the same as heart attack. Furthermore, it recently has been shown that heart attacks cause only a small minority of sudden cardiac deaths.

The event that causes sudden cardiac death is an electrical "accident" in which the heart's electrical conduction system becomes so disorganized that the heart beats wildly and erratically and cannot perform its pumping function.

Unlike heart attack, suddenly cardiac death rarely is the first manifestation of coronary heart disease. Approximately 85 percent of those who succumb to sudden cardiac death have significant coronary disease, and often have a history of heart attack and impaired function of the pumping chambers of the heart. Researchers in this area have, therefore, postulated that if those at risk for sudden cardiac death could be identified, and if therapy were available, a substantial number of sudden cardiac deaths could be prevented.

CPMC has a strong interest in arrhythmias, their genesis, mechanism and management. The Arrhythmia Control Unit here is one of the most sophisticated such centers anywhere. The Unit has contributed much to the understanding of arrhythmias and has pioneered in innovative clinical management of arrhythmia patients. CPMC has wide experience with drug therapy to control arrhythmias and was one of the first centers worldwide to perform arrhythmia surgery for patients who do not respond to drugs.

In recent years, work done here has added significantly to major new developments in the area of arrhythmia research. The most important of these is identification of patients with complex ventricular arrhythmias, in particular ventricular tachycardia resulting from heart attack, as those at greatest risk for sudden cardiac death. Indeed, ten percent of these people suffer sudden cardiac death within a year after their heart attacks.

With identification of those at risk, the first step toward prevention of sudden cardiac death has been taken. The questions then are: "Are means available to control these life-threatening arrhythmias?" and "Will control improve survival?"

To date, work with antiarrhythmic drugs has been promising but inconclusive in terms of wide-range applicability of drug therapy. The drugs available either were unable to adequately suppress arrhythmias or their use was limited because of side effects. In addition, previous studies of drug therapy were too small to produce sufficient hard data on the efficacy of the drugs.

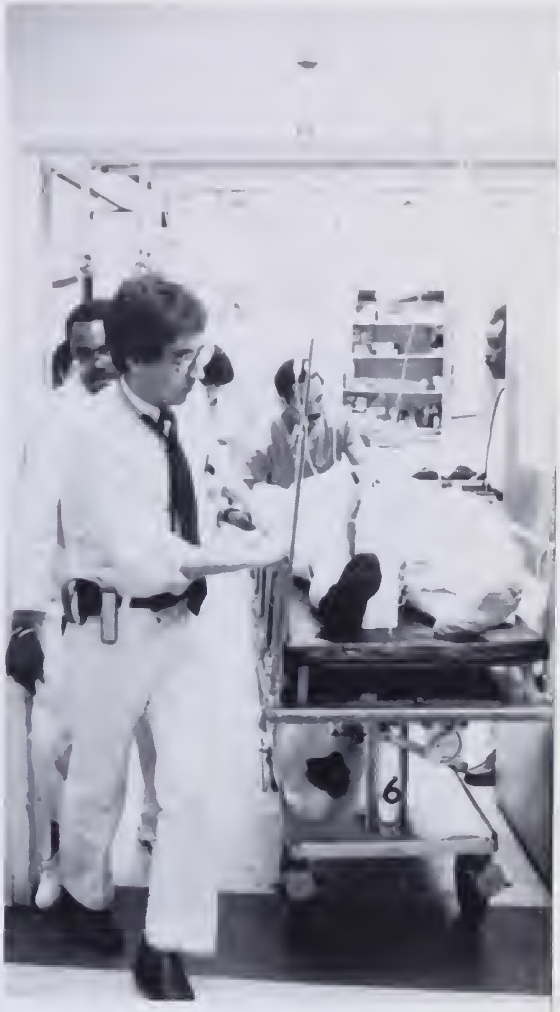
However, recently, new antiarrhythmic drugs have become available, drugs which appear to be both more effective and less toxic while showing promise of controlling arrhythmias. Perhaps, they even may prevent sudden cardiac death.

The National Heart, Lung, and Blood Institute of the National Institutes of Health has initiated CAPS (Cardiac Arrhythmia Pilot Study) to identify the best approach to management of death-dealing arrhythmias following heart attack. The object of the study is to compare the effectiveness of various drug strategies in suppressing ventricular arrhythmias and to evaluate the drugs' safety in order to determine if a drug regimen can be selected which can be used to control arrhythmias safely and effectively in the year after a heart attack.

In keeping with its prominence in the area of arrhythmia control, CPMC is one of the ten centers in the United States and Canada taking part in CAPS and chairs the steering committee.

Each of the participating centers will enroll 50 patients within six to 60 days after the patients' heart attacks. These patients will be carefully characterized by means of special tests and will be placed on one of five treatment regimens.

If, as hoped, the most effective and safe treatment is identified in CAPS, a full-scale trial will be forthcoming to determine the full extent of improvement in survival that can be achieved.


Moments count for patient stricken by certain types of arrythmias

Novel Approaches to Community Health Education

Patient care at an academic medical center is not inexpensive. But when a medical center finds itself in an area where all the local community hospitals and most physicians' primary care practices no longer exist, it has a special responsibility to serve as the family health center to the neighborhood and to do so in such a way that the costs are reasonable.

The Washington Heights/Inwood community was in just such a situation and a plan has been established to provide routine health care services in lower-cost community settings by The Presbyterian Hospital. Equally exciting is the possibility that services can be provided to prevent illness.

One of the most innovative programs of this kind at the Medical Center is the Center for Population and Family Health's public health education program. One area of concern has been the rate of late or no prenatal care. Under a grant from the Ford Foundation, health workers, operating in the outpatient areas and in the surrounding community, are attempting to facilitate access to prenatal services. In addition, this program is striving to increase the percentage of women who breastfeed their newborns, and to increase access to well baby care for their infants. A positive attitude toward breastfeeding is reinforced by the nursing staff, obstetrician/gynecologists, nutritionists, pediatricians, as well as an interdisciplinary committee which focuses on strategies to promote breastfeeding. Women who decide to breast feed their babies have much healthier babies, just as women who have prenatal attention by their obstetricians have fewer complications in childbirth and healthier babies.

The Center's "Health Education for Youth" program focuses on the adolescent population which uses the Young Adult Clinic. Through the use of improvisational theater techniques, this group of youngsters helps other teenagers cope with the stresses of growing up, school, parental conflicts, drugs, sex, etc. No adults lecture to them. This program is able to use a peer education approach to create positive change.

Another program, operated in cooperation with Red Cross, is "Operation Baby Track." Operation Baby Track is a system of notifying young mothers of the need for immunization at specific intervals after the birth

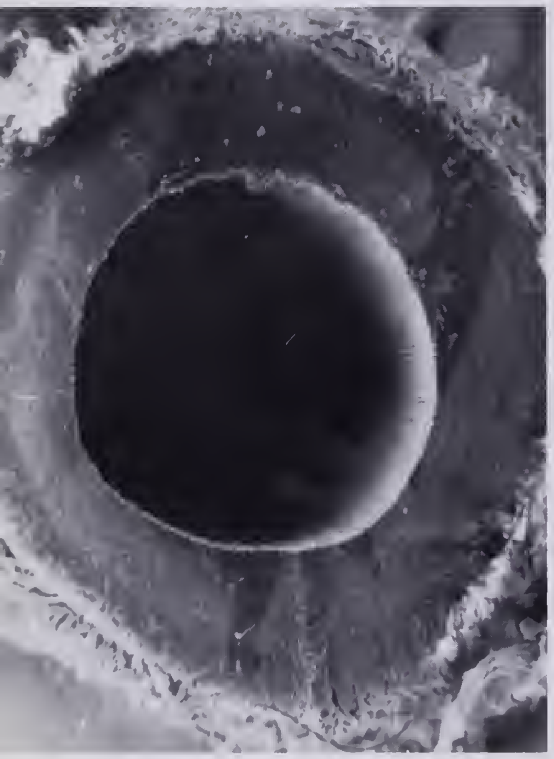
of their children. It uses volunteers to follow-up with high-risk mothers.

At the other end of the age spectrum is MERGE (Model for Evaluation and Referral in Geriatrics), a multidisciplinary program for assessing the multi-problem elderly patient, developed by the Division of General Medicine and the Center for Geriatrics and Gerontology. Working with AIM (Associates in Internal Medicine), the Hospital-based group practice, physicians, nurses, nursing faculty and students of nursing perform screenings at senior centers on a routine basis. Referral to physicians are made if any medical problems are identified. In addition to being extremely well received by the seniors, the program provides an opportunity for nurses and physicians to gain expertise in the field of geriatrics and to work with geriatric nurse practitioners, geropsychiatrists, social workers and physiatrists to develop care plans for the chronically ill elderly.

For the generally healthy population of Washington Heights/Inwood, the Hospital runs an annual health fair during which approximately 60 hospital staff provide screenings for over 1,200 individuals. The Hospital now is looking for support to expand this commitment into a year-round health promotion program focused on seniors and school children.

In addition to having a higher-than-average proportion of children and the elderly, Washington Heights/Inwood is noted for its large immigrant populations. Years ago, the area was populated by immigrants from Ireland and refugees from Germany. Today, most of the population is Hispanic, with a large proportion of immigrants coming from the Dominican Republic and smaller percentages from Cuba and Central and South America. For many of these individuals, social, cultural and linguistic barriers can stand in the way of their getting the health care that they need. As result, through the "Lifestyles" speakers bureau program, the Hospital has been providing seminars in Spanish to orient recent immigrants to the New York City health care system. With the assistance of the Health Education Committee of the Community Health Council and the Health Education Steering Committee of the Medical Center, it is expected that these programs will be expanded even further in 1984.

Coronary Artery Disease Can Be Prevented



Blood vessels are being studied to understand how abnormalities lead to stroke, heart attack

Coronary artery disease, the leading cause of death in the United States, is being brought under control. Americans now can live better and longer. There may be a time in the not too distant future when coronary artery disease will go the way of infectious diseases as the country's major killer.

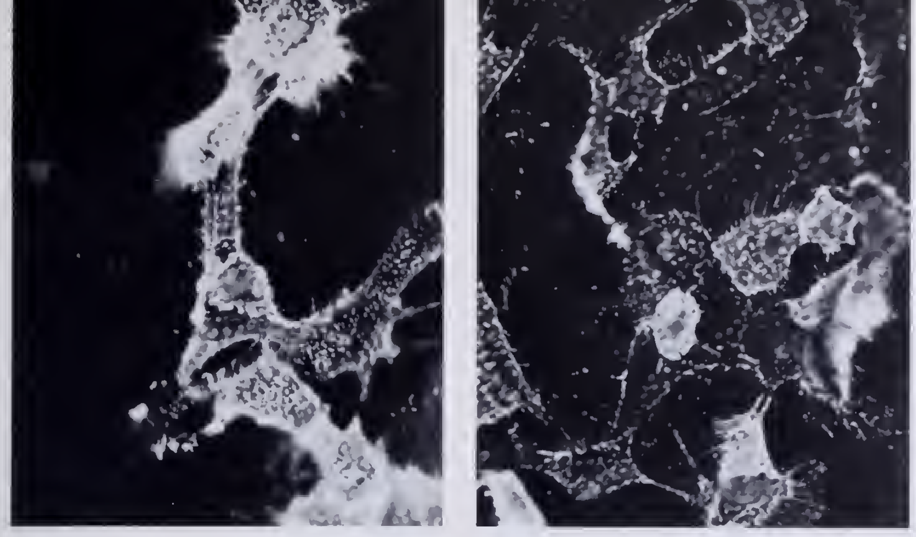
The cardiovascular death rate has declined by more than 37 percent since 1963. There are many reasons for this. It is now possible to identify those at risk for coronary artery disease and to reduce the risk factors, such as high blood pressure, cigarette smoking, and high blood cholesterol, the reduction of which was recently proven in a landmark study to be effective in lowering the risk of death and heart attacks. More is known now about the pathological process that underlies coronary artery disease, allowing physicians to slow or arrest its course by means of diet or drug therapy and, in many cases, to prevent its most deadly manifestation, heart attack. New techniques for managing heart attack save the lives of many. New drugs and bypass surgery improve the quality of life and may prolong life for others with advanced disease.

The Columbia-Presbyterian Medical Center has a long tradition of commitment to overcoming coronary artery disease. Today this tradition continues. CPMC truly is a "complete heart center." From basic research into the causes of coronary artery disease and its process to the most advanced clinical management, there is no area in which CPMC researchers and clinicians are not in the very forefront of the battle against coronary artery disease.

The pathological process responsible for almost all coronary heart disease, and for strokes and peripheral vascular disease as well, is a process known as atherosclerosis. This usually is a progressive disorder in which the inner walls of arteries such as the ones supplying the heart become thickened and irregular with deposits of fatty substances that form a lesion called plaque. Heart attacks occur when clots hemorrhage or spasm occurs in narrowed, atherosclerotic coronary arteries, further blocking these vessels and depriving the heart of blood.

Heart attacks are the all too frequently lethal culmination of a process that goes on quietly and unnoticed for many years. Two thirds or more of a coronary artery may be blocked with fatty deposits before a person experiences any symptoms at all. Because the process is so silent and secret and because the very first symptom, a heart attack, also may be the very last, waiting for clinical symptoms at all is waiting too long. Fortunately, there are alternatives.

Primary prevention of atherosclerosis is the main goal of the Specialized Center of Research in Arteriosclerosis (SCOR), a multidisciplinary program of research and clinical activities covering the broad field. Funded by the National Heart, Lung, and Blood Institute of the National Institutes of Health, it is one of eight such centers nationwide and the only one in the northeast. Although mainly under the aegis of the Department of Medicine, the cooperative effort



Human fibroblast cells (left), when exposed to fluorescent probe, show how low density lipoprotein binds to cell surface. Researcher (below) studies growth factor, which may be implicated in clotting

Dr. Larry Witte examines endothelial cells in culture to determine relationship of cell acidity to clotting

Stress test is a key component of diagnostic studies to uncover cardiovascular risk factors

draws on the resources of many other departments, including the Departments of Physiology, Pediatrics, Pharmacology, and Anatomy and Cell Biology.

The SCOR at CPMC comprises seven units. The core facilities and functions of the program include a research clinic, a lipid laboratory, a biomathematics/biostatistics resource facility, and a tissue culture laboratory. Other units concentrate their efforts on research in such areas as normal and abnormal regulation of coronary blood flow or the relationship between the hemostatic system and atherosclerosis. Studies of the metabolism of lipoproteins and of the endothelial cells lining blood vessels also are part of the SCOR program.

The work of all units is collaborative, and all units participate in the work of the core facility. In addition, the program serves as an important institutional resource. SCOR researchers share information and expertise with other research groups within the Medical Center working on areas related to coronary artery disease, such as a group in Psychiatry looking at type A personality and one in Neurology investigating cerebrovascular disorders.

The SCOR Research Clinic is a major referral center for patients with lipid disorders, in particular high cholesterol. A large number of new patients are seen here each year. SCOR physicians currently are following approximately 400 patients. These patients receive, free of charge, the most comprehensive evaluation and advanced care available anywhere and, in turn, serve as a resource populaton for the ongoing research programs of the Center, such as studies of whole body cholesterol metabolism and clinical pharmacological studies of drugs to reduce abnormally high cholesterol levels.

The clinic also has an important educational function, exposing students, house staff, and postdoctoral fellows to the most advanced concepts in diagnosis and treatment of cholesterol problems, as well as to the methods of clinical research.

Renewed Commitment to Conquer Stroke

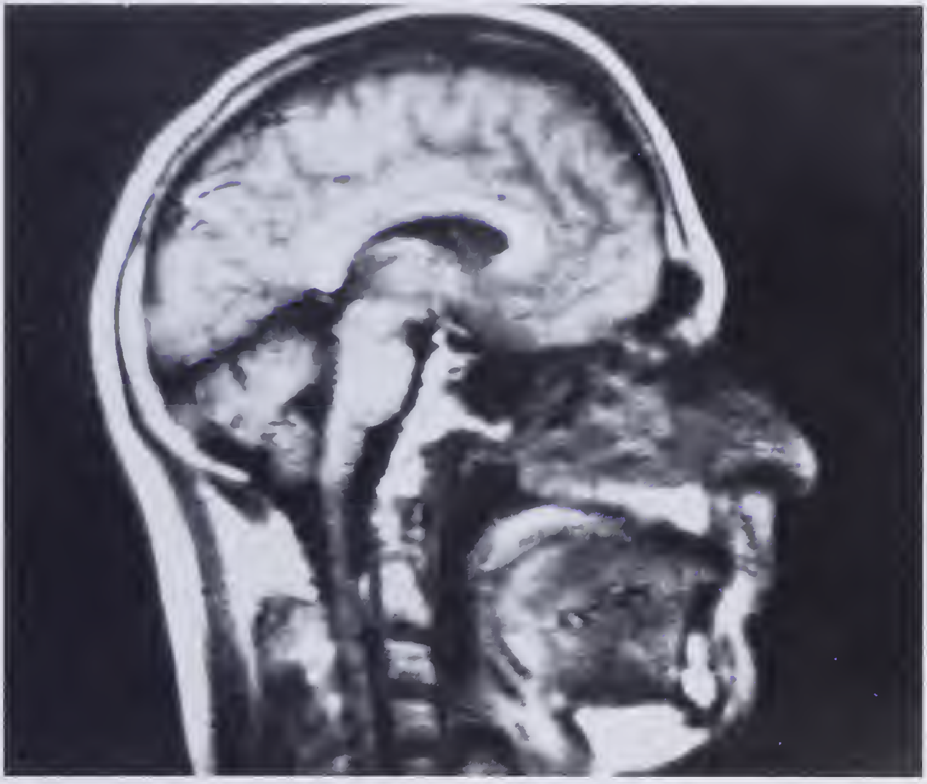
Stroke claims the lives of more than 164,000 people a year and debilitates many times more. While it is more likely to affect elderly people with high blood pressure, it also can strike a youngster or a person in his 20s.

Years ago, many stroke victims were considered "lost causes." When the blood supply to the brain is cut off in a stroke, brain tissue in the affected area may die, in some cases causing paralysis and loss of speech.

Advances in medication over the last few decades, such as the development of anti-hypertensives to control high blood pressure, a leading risk factor in stroke, have helped to prevent this debilitating illness.

New computerized diagnostic techniques, such as the newly installed multinuclear magnetic resonance device at CPMC, can help physicians peer harmlessly inside the brain and distinguish living, dying or dead tissue. By observing changes in sodium levels of this tissue, they can see if the tissue affected by the stroke still is living, and if they may be able to reverse any further stroke damage to that patient.

Another diagnostic tool available here, the "ranged-dated duplex Doppler," enables physicians to predict a patient's susceptibility to stroke by studying the sound of blood as it courses through the carotid artery in the neck, moving upward to the brain. Depending on whether the flow is turbulent or placid, diagnosticians can determine whether the patient needs treatment to prevent a possible stroke, or to prevent a second stroke if one already has occurred.



Multinuclear magnetic resonance studies

The cause of a stroke is one factor which helps determine the outlook for each patient. Also, the extent of damage will determine how much a patient can recover. If a 24-year-old man has a stroke after he is struck in the carotid artery in an accident, for example, it is likely that there would be minimal brain damage and unlikely that he would have another stroke. A 3-year-old with a rare stroke could recover with hardly any noticeable brain damage, because other parts of his young brain would be able to pick up the tasks that the damaged part otherwise would perform. Severe damage to an older stroke patient could be reversed with arterial bypass surgery.

Developer of nuclear magnetic resonance Dr. Sadek Hilal, examines NMR studies of brain

In many cases, the cause of stroke is straightforward. Atherosclerosis, a vascular disease in which fat and cholesterol build up and become encrusted on the inside walls of arteries, is a common cause of stroke. As the clump gathers more cholesterol crystals, the channel of the artery narrows, reducing blood flow. If a clot forms and cannot pass through the narrow channel, it can become lodged and may cut off blood supply to the brain.

Some strokes are caused by cerebral hemorrhaging, by a sudden shutdown of blood vessels in the brain, or by an aneurysm. Other strokes have no known cause.

If a clot is wedged in a clogged arterial passage, neurosurgeons sometimes can remove the obstruction and restore normal blood flow in the artery. If the blocked area is in an area deep within the brain, the neurosurgery team can perform a bypass by attaching an adjacent artery to other arteries to delivery blood to the affected area.

An arteriovenous malformation (AVM) is another abnormality of the blood vessels that can lead to stroke. An AVM is an abnormal group of diseased blood vessels which can hemorrhage suddenly. Physicians at CPMC pioneered a procedure called embolization, in which a blocking substance is sent through a catheter into the vessels that supply the AVM with blood. Once the blood supply to the damaged area is cut off, neurosurgeons often can safely remove the AVM.

By successfully combining embolization and surgery, the success rate of AVM cases is outstanding.

The newly developed stroke program here depends upon a balanced mutual interdependence between the laboratory sciences and clinical care. The stroke team is a cooperative effort among neurologists, neurosurgeons, radiologists, nurses, pathologists, epidemiologists and rehabilitation medicine physicians.

After stroke patients are medically stabilized, they are referred to Rehabilitation Medicine for evaluation. Some will require a short period of therapy that lasts only a few days. Others will have to spend several months learning, for instance, how to control their arm and leg muscles to prevent loss of range of motion, and stretching to regain muscle control. Most will be able to learn how to walk again and to use their arms.

The goal of rehabilitation is to maximize whatever motor or speech capabilities a patient has after suffering a stroke so that he can be as independent and mobile as possible.

By working as a team, these medical practitioners and therapists are able to provide the best possible care for patients, and to translate quickly advances in the field from research to clinical practice.

At CPMC's new Stroke Study Center, physicians and researchers are cooperating with four other major medical centers nationwide in a comprehensive program to diagnose, treat and study strokes.

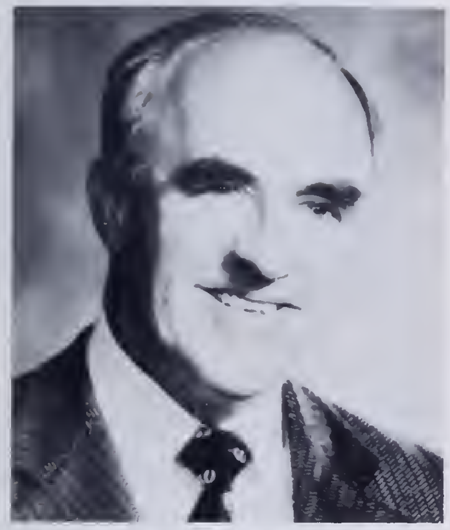
Under a supporting grant from the National Institutes of Health, CPMC and the other medical centers are pooling their experience with stroke cases. This pooling of information will increase their ability to interpret the data from each individual case, thus leading to more effective treatment, management and prevention of stroke.

The aim of the Stroke Data Bank study is to glean a series of clinical pictures that are typical for certain types of strokes. These typical cases then can be used as references to accelerate the diagnosis and treatment of stroke victims who have symptoms pointing to a particular kind of stroke.

The medical staff here manages more stroke patients than any other institution in the world. With a clinical caseload of 700 patients a year, CPMC also has the greatest amount of diversity of stroke cases in the study.

By gathering data on all patients treated here and at the other participating study center, researchers are trying to determine the various causes of stroke and the best therapies for stroke patients.

Report of the Trustees
Columbia University
The Presbyterian Hospital



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Medical science generally advances slowly and undramatically, rarely by leaps and bounds. The achievements of a given year almost always build upon the accomplishments of previous years, steadily bringing the various areas of medicine a little closer to their objectives and this Medical Center's overriding goal, the conquest of disease.

In 1983, this steady progress was evident as usual, but there also was an unusual number of more noticeable advances and significant new programs which promise to have a major impact on the enhancement of medical knowledge and the improvement of medical care.

To make certain that we take maximum advantage of these achievements and of our recognized excellence as a biomedical research, teaching and clinical care institution, the managements of The Presbyterian Hospital and Columbia University are concentrating on plans for the future. By the end of this decade the Columbia-Presbyterian Medical Center will be virtually reshaped and transformed.

Hospital management, with the full support of the Board of Trustees, has developed detailed blueprints for a major modernization program for which approval is expected in 1984.

The University Trustees have authorized the development of a biomedical research park east of Broadway, which not only will upgrade the research facilities of the Columbia Health Sciences Division, but also is expected to attract the research efforts of private industry.

The year brought some major changes in leadership, as well. In addition to two new Chairmen of the Boards of Trustees, Dr. Robert Levy, former Director of the National Heart, Lung and Blood Institute, was appointed Vice President for Health Sciences at Columbia. His predecessor in that job, Dr. Robert Goldberger, became Provost of the University.

One of the highlights of the year for both the University and Hospital was the establishment of a multinuclear NMR facility. NMR (Nuclear Magnetic Resonance) is an extremely powerful body scanner that enables physicians, among other things, to observe the damage caused by stroke immediately after it occurs. It is the only noninvasive imaging technique that can immediately indicate the degree of tissue damage in a living human and which may enable physicians to tell whether a stroke is reversible. As a research tool, it is capable of investigating cellular and chemical processes never before accesible to study.

The year also was notable for the introduction of a regional *in vitro* fertilization (test-tube baby) program and the dedication of the Center for Women and Children, the Ambulatory Cancer Center, Geriatric Dentistry Program, Primary Care Center (our first clinical program located off-campus), and the Center for the Study of Science and Medicine.

As our exciting plans for revitalization and modernization of the Medical Center become more detailed, there will be even more to report. We hope all of the friends of the Medical Center will be following our progress closely.

Columbia University Report

Exciting new initiatives are under way whose goal is the reshaping of this campus. These projects will physically transform the Medical Center and its neighborhood for the benefit of all who live or work here or who come as students or patients, and will generate the intellectual renewal and exploration of scientific and clinical frontiers on which the vitality of an academic medical center depends.

The University advanced its preparations for the Audubon Research Park, submitting details of the proposal to the City of New York. Approval will clear the way for acquisition of the Audubon Ballroom site, a key element in the long-range plan.

The Park's 5.5 acres would reach from Broadway east to Audubon Ave., and from 165th to 168th Street. All current structures would be removed except for the Ballroom, which is to be renovated.

Two buildings, one for P&S faculty and the other for firms that research and develop biomedical products, would be the main structures in the Park. Linked by bridges to a parking garage, they would provide essentially side-by-side working environments for Health Sciences faculty and their counterparts in industry. The new Center for the Study of Molecular Approaches to Disease would be based in the University building. Its focus will be on genetic disorders (including genetic causes of cancer), neurobiology and behavior, immunobiology, pharmacology and toxicology, and cardiovascular disorders.

Neighborhood residents would benefit from many new jobs. In addition, they, as well as CPMC personnel and industry employees, would enjoy convenient shopping, a day-care center, an upgraded subway station, greater security and less traffic congestion at Broadway and 168th Street. The Park would thus help to revitalize our neighborhood while enabling the Health Sciences to forge stronger and more efficient relationships with industry.

The Howard Hughes Institute in Molecular Biology has been created with funding amounting to about $20 million over the next five years, renewable for as long as 30 years. It will bring together Columbia's pioneering research into the neurobiology of learning and behavior and the application of recombinant DNA techniques to the study of brain genetics and development. Senior Investigator of the Center will be University Professor Eric Kandel; his associates will be Hughes Investigators Dr. Richard Axel, Professor of Biochemistry and Pathology, Dr. James Schwartz, Professor of Neurology and Physiology, and several junior faculty to be recruited.

The Center for the Study of Society and Medicine, directed by Professor David Rothman, took a number of important steps during the past year. New faculty from law, sociology and social work joined the Center and with Dr. Rothman now make rounds on various services. Center staff also sit on the Institutional Review Board and participate in the work of committees on critical care and neonatal ethics. With clinical faculty as preceptors they presented "Society and Medicine," a required course for second-year medical students.

The Center also defined its initial research agenda. In the months ahead it will undertake an interdisciplinary analysis of intensive care. Another study will examine the flow of information between health personnel and patients. The high technology of contemporary medical care poses difficult challenges such as securing patient autonomy, and this project may result in the formulation of new policies. The Center also intends to explore the changing situation of women in medicine and will study the relationships of law and medicine, particularly the issue of "defensive medicine." In the domain of professional and public service, the Center

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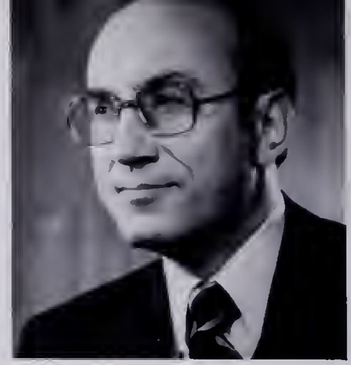


Michael I. Sovern
President, Columbia University

Robert I. Levy
Vice President, Health Sciences

The First Medical Center

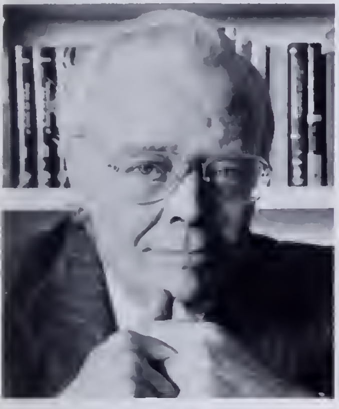
The Columbia-Presbyterian Medical Center was founded in 1928 as the nation's first to incorporate a private medical school and a private, voluntary teaching hospital. It was — and remains — a *complete* medical facility, incorporating education, research and clinical care in one site.

Although it is organizationally broad and complex, its two major components are The Presbyterian Hospital and Columbia University, each of which is an independent corporate unit joined in contractual partnership, known as the "permanent alliance agreement."

The Presbyterian Hospital, headed by Felix E. Demartini, M.D., President, comprises the patient care component of the medical center, including all the special care units such as those devoted to neurological diseases or reproductive medicine.

Michael Sovern is President of Columbia University. Columbia's medical campus is headed by Robert E. Levy, M.D., Vice President for the

Felix E. Demartini
President, The Presbyterian Hospital



Donald F. Tapley
Dean, Faculty of Medicine

Health Sciences. It consists of the Faculty of Medicine, under Donald F. Tapley, M.D., Dean, including the College of Physicians & Surgeons, the School of Nursing and the School of Public Health; and the School of Dental and Oral Surgery and the Allied Health Program. These units educate and train physicians and other health professionals, and conduct both clinical and basic research.

Departmental chairmen and physicians with responsibilities for clinical care as well as teaching and research hold appointments in both institutions (or in one of Columbia's seven other affiliated hospitals). Faculty members in the basic science departments generally hold Columbia University appointments only.

A unique but integral part of the Medical Center is the New York State Psychiatric Institute, a state-supported facility that also serves as the Department of Psychiatry for Columbia and the Psychiatry Service for The Presbyterian Hospital.

The Presbyterian Hospital Report

In 1983 The Presbyterian Hospital completed its "Priority Projects" program to improve patient care facilities that had to be upgraded so they could continue to be used for the five years it will take to fully modernize the Hospital. At the same time, planning was underway for an extensive modernization program, which will completely restructure the way we operate here at Columbia-Presbyterian Medical Center.

The Presbyterian Hospital is developing a comprehensive modernization program designed to curb the dangerous decay of health care services in the Washington Heights/Inwood community. The program calls for the consolidation and modernization of The Presbyterian Hospital's fragmented and aged high-technology facilities used by hundreds of thousands of patients throughout the community and the world, and development of a community health network.

When it is modernized, Presbyterian will relinquish 100 of its 1291 beds to offset the cost of a new, 300-bed community hospital. Presbyterian will continue to treat referral patients and people from the immediate neighborhood at its 168th Street campus, and will supply the new community hospital with staff and support services such as back-up, high-technology medical care; laundry and medical supplies. As a result, the new hospital will be able to devote all of its resources to administering high quality, basic care to a larger number of community patients at the lowest possible cost.

Patients who do not need to be hospitalized, but who need skilled nursing care will benefit from a proposed, 80-bed long term care facility, planned to ease the backlog of patients awaiting nursing home placement. Day care and home care programs will be developed for frail, chronically ill and disabled patients who are capable of living at home with professional assistance. And an "ambulatory care network" will "seed" the area with doctors in private practices who would be provided with services such as office help, and computerized medical and billing records.

Our first attempt to provide services off campus occured early in 1984 with the opening of a Primary Care Center on Nagle Avenue, a short distance away from Jewish Memorial Hospital, the last community hospital in the area, which was closed in 1983. In addition to attempting to provide services for individuals who used the clinics at Jewish Memorial, the Primary Care Center was located in the Inwood section of Community District 12 because that area was designated a "Health Manpower Shortage Area" by the Federal government. Although the Primary Care Center is not part of the proposed Ambulatory Care Network Corporation, which is expected to begin operating later in 1984, it did provide an opportunity to test our new computerized medical record system, which enables patients to be treated either at the Center or in any number of ambulatory care programs at the Hospital. At any location, authorized staff have instant access to their patients' medical records, thanks to this system which was developed under a grant from the John A. Hartford Jr. Foundation.

Late in 1983, the Hospital celebrated the dedication of its Center for Women and Children, which is located in buildings which formerly housed only Babies Hospital. Now it includes, in close proximity, Babies and the Sloane Hospital for Women. This outstanding patient care center contains highly sophisticated labor and delivery facilities with services ranging from clinical programs for high risk pregnancies and *in vitro* fertilization to birthing rooms. These contain a minimum of clinical equipment in order that normal childbirth can take place in a home-like atmos-

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Columbia Report

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is developing programs of scholarly exchange and is collaborating with other faculties of the University to share its findings with the public.

The School of Dental and Oral Surgery is implementing a curriculum in geriatric dentistry, with the support of a five-year, $450,000 NIH grant. Beginning this year, every senior dental student will be responsible for the care of geriatric patients. The students will be trained to assess and manage the elderly patient's psychological, social and economic difficulties as they bear on dental care. Other curriculum components will include didactic instruction and research experiences relevant to the special needs of the older patient.

The School of Nursing is participating in imaginative new interdisciplinary and interinstitutional programs. In the MERGE program, nurse practitioner students and faculty have joined other Medical Center practitioners to provide care to a large, low-income population of well, frail, and handicapped elderly people at the Fort Washington Senior Center. The program gives medical and nursing students exposure to interdisciplinary management, and faculty the opportunity to maintain clinical competency and to conduct research.

Through a collaboration between the School and the Presbyterian Hospital Department of Nursing, selected students in the Master of Science Acute Care Nursing Specialty program who are on the staff at the Hospital have their clinical experience in their work setting. This arrangement has important advantages for students and may encourage many to undertake part time graduate education.

An unprecedented number of endowed professorships were created during the past year, including the John H. Keating Professorship in Medicine, the Richard and Mildred Rhodebeck Chair in Dermatology, the Sciarra Professorship in Clinical Neurology and two Higgins Professorships in Basic Sciences. The first incumbent also was named to the previously established Jose Ferrer Jr. Professorship in Surgery. And for the second time in history, a P&S faculty member was named as one of only four Unversity Professors at Columbia.

At year's end, Columbia President Michael Sovern announced the formation of a Presidential Commission on the Future of the University. Among 17 members from throughout the University are Dr. Isidore S. Edelman, the Robert Wood Johnson Jr. Professor and Chairman of Biochemistry, Dr. Georgiana Jagiello, the Virgil Damon Professor of Obstetrics and Gynecology and Professor of Human Genetics and Development, and Dr. Robert Levy, Professor of Medicine and Vice President for the Health Sciences. Dr. Robert Goldberger, Former Vice President for the Health Sciences and now Provost of the University, will chair the Commission.

President Sovern charged the Commission with the responsibility for "critically assessing our curent condition — our intellectual activities, our financial resources, and our physical facilities — in relation to our role in American and international higher education . . . It will need to identify changes occurring in the national environment for higher education and to assess their potential impact over the remainder of this century."

Finally, he charged the Commission with the task of answering the question: What should Columbia be in the nineteen nineties? "If we answer that question wisely, we shall have prepared not only for the next decade, but for the next century."

Presbyterian Report

(continued from p. 35)

phere, without the intrusion of unnecessary technology, although the latest technology is near by in case it should be needed. These facilities also are down the hall from an existing neonatal intensive care unit for premature and otherwise seriously ill newborns, many of whom are transported here from other hospitals in the tri-state region.

The Hospital also opened its new Ambulatory Cancer Center for adults, which enables many cancer patients who normally would have to be hospitalized for chemotherapy to come in for their treatments during the day and go home in the evening.

Also in 1983, a "very important person" gave a boost to one of the Hospital's very worthwhile programs. First Lady Nancy Reagan visited the Foster Grandparents Programs at our Hospital to show her support for these special seniors and the work they do here. Foster grandparents at Presbyterian are particularly helpful in two respects. On patient care floors in the Babies Hospital division, they serve as surrogate parents for children whose real parents cannot visit for one reason or another. In our child abuse prevention and treatment program, foster grandparents serve as role models for parents who have abused or neglected their children.

In 1984, we plan to build upon our achievements and move forward rapidly with plans for reshaping the delivery of medical care over the remainder of this century and beyond. Never before has a private, voluntary hospital attempted to develop programs as comprehensive as the ones we hope to institute, nor has any academic medical center ever made a commitment to excel in the provision of community services to the same extent it excels in research, teaching and advanced medical care.

Just as The Presbyterian Hospital and Columbia-Presbyterian Medical Center were role models for most academic medical centers over the past 55 years, we expect that our new programs once again will set the pace for the next half century.

Financial Summary: The Presbyterian Hospital

Increasingly efficient operation of The Presbyterian Hospital has resulted in a steady improvement in the financial picture over the past few years.

The loss from operations last year was nearly half the loss in the previous year—$4.2 million, compared with $7.8 million in 1982. This was due primarily to a moderation in the rate of increase of expenses, coupled with a lower rate of inflation. At the same time, pent up demand for services could be met, as inpatient areas undergoing rehabilitation were reopened, which resulted in some increased revenues. The improvement in the financial picture also was aided by changes in reimbursement regulations which resulted in better payment for indigent care. It is noteworthy, however, that the Hospital was able to reduce expenses and cut its operating loss in half at a time when the volume of patient care services increased.

The Hospital's mission to provide service to the community regardless of ability to pay was reflected in the constantly increasing demand for outpatient services and the increase in visits by patients with Medicaid coverage, as well as "self pay" patients—a euphemism for patients who pay the minimum rate on the Hospital's sliding fee scale, or nothing at all. The total number of outpatient visits, including visits to doctors' private offices, exceeded 700,000 in 1983.

Understandably, the Hospital is approaching the physical limit of its ability to provide outpatient services, and cannot afford to expand its outpatient facilities on campus—one of the most costly approaches to providing primary care. As an alternative, the Hospital established its first outpatient service off-campus, in the vicinity of the community hospital which was closed last year. It is expected that an Ambulatory Care Network Corporation will be approved early in 1984, and that additional off-site facilities can be established through the ACNC to slow the growth in ambulatory care costs, a major contributor to this Hospital's 1983 operating loss.

Despite a steady improvement in the fiscal picture at the Hospital, the management and Trustees of The Presbyterian Hospital believe that reimbursement alone will not provide adequate financial support in the future to assure that the Hospital can continue to meet its commitment to the community, as well as its mission to remain the premiere center of excellence in the world of academic medicine. In response to this analysis of trends in the health care field, a new corporation was established by the Trustees to develop new sources of revenue. It is hoped that this new corporation, Presbyterian Health Resources, Inc., will grow to the point where it becomes a major source of revenue for these essential programs.

Statements of Revenues and Expenses and Changes in Unrestricted Fund Balances for the Years Ended December 31, 1983 and 1982

The Presbyterian Hospital Financial and Statistical Review*

(In Thousands)

	1983	1982
Operating Revenues:		
Patient service revenues	$287,633	$232,211
Allowances and uncollectable accounts	(62,063)	(29,488)
Net patient service revenues	225,570	202,723
Other services	13,363	12,129
Transfers from specific purpose funds	4,647	4,261
Total operating revenues	243,580	219,113
Operating Expenses:		
Salaries and related fringe benefits	165,440	147,777
Supplies and other expenses	67,786	66,674
Depreciation	14,566	12,456
Total operating expenses	247,792	226,907
Loss from Operations	(4,212)	(7,794)
Non-operating Revenues:		
Investment income	4,425	6,719
Legacies and contributions	1,553	1,980
Realized net gain on sales of investments	257	249
Total non-operating revenues	6,235	8,948
Revenues Over Expenses	2,023	1,154
Fund Balance, January 1	126,559	114,466
Transfer from (to) Restricted Funds for:		
Additions to property, plant and equipment	19,199	23,395
Funding of depreciation	(14,566)	(12,456)
Transfer of Board Designated Funds to Presbyterian Health Resources, Inc.	(12,780)	
Fund Balance, December 31	$120,435	$126,559

In-Patient Statistics	1983		1982	
	Adult Pediatric	Newborn Nursery	Adult Pediatric	Newborn Nursery
Average Bed Complement	1,234	59	1,218	59
Patient days	405,009	16,099	388,668	15,602
Admissions	42,219	3,845	41,741	3,809
Average length of stay	9.57	4.32	9.29	4.29

Outpatient Statistics	1983	1982
Number of Visits:		
Medicaid	195,458	175,742
Medicare	75,854	74,784
Blue Cross	9,571	7,780
Self pay	139,814	139,463
Personnel and dependents	23,007	25,251
Total	443,704	423,020
Doctors Offices	274,577	275,472
Grand Total	718,281	698,492

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*A complete financial report can be obtained by writing the Finance Department, Presbyterian Hospital, 622 W. 168 St., New York, NY 10032

Columbia University
Health Sciences Division 1982-83 Highlights

	(in thousands)	
Academic Expenditures		
*College of Physicians and Surgeons	$147,403	
School of Dental and Oral Surgery	5,880	
	$153,283	
Operating Expenditures		
Library	832	
Physical Plant Administration	5,451	
Building and Equipment Maintenance	1,111	
Custodial Services	1,529	
Security	891	
		9,814
		163,097
**Gifts and Receipts Balance		
*College of Physicians and Surgeons	13,785	
School of Dental and Oral Surgery	630	
		14,415
**Endowment Principal		
*College of Physicians and Surgeons	99,034	
School of Dental and Oral Surgery	3,595	
		102,629
Quasi Endowments		
*College of Physicians and Surgeons	55,092	
School of Dental and Oral Surgery	66	
		55,158
		172,202

Number of Students		
Medical School	602	
Other Faculty of Medicine programs	186	
School of Public Health	479	
School of Nursing	360	
School of Dental & Oral Surgery	311	
	1,938	
Full-time Faculty		
*College of Physicians & Surgeons	634	
School of Dental & Oral Surgery	40	

*Includes the School of Nursing and the School of Public Health

**Includes funds in Columbia University and CPMC Fund, Inc.

Columbia University's fiscal year ends June 30.
Requests for information may be directed to
the Office of the Controller, Columbia University
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Columbia University

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The Presbyterian Hospital in the City of New York

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Anesthesiology

Robin M. Rankow, M.D., D.D.S.
Otolaryngology

Thomas V. Santulli, M.D.
Surgery

Edward B. Schlesinger, M.D.
Neurological Surgery

Hamilton Southworth, M.D.
Medicine

Charles M. Steer, M.D.
Obstetrics & Gynecology

Frank E. Stinchfield, M.D.
Orthopedic Surgery

Carmine T. Vicale, M.D.
Neurology

Jules G. Waltner, M.D.
Otolaryngology

James A. Wolff, M.D.
Pediatrics

Consultants Emeriti

Hugh Auchincloss, M.D.
Surgery

Viola W. Bernard, M.D.
Psychiatry

Stanley E. Bradley, M.D.
Medicine

Gordon M. Bruce, M.D.
Ophthalmology

Howard G. Bruenn, M.D.
Medicine

Stuart W. Cosgriff, M.D.
Medicine

Andre F. Cournand, M.D.
Medicine

George F. Crikelair, M.D.
Surgery

Robert C. Darling, M.D.
Rehabilitation Medicine

D. Anthony D'Esopo. M.D.
Obstetrics & Gynecology

Cushman D. Haagensen, M.D.
Surgery

George H. Humphreys, II, M.D.
Surgery

Harold W. Jacox, M.D.
Radiology

Ferdinand F. McAllister, M.D.
Surgery

Rustin McIntosh, M.D.
Pediatrics

Carl R. Oman, D.D.S.
Dentistry

Charles A. Perera, M.D.
Ophthalmology

J. Lawrence Pool, M.D.
Neurological Surgery

Harry M. Rose, M.D.
Medicine

Solomon N. Rosenstein, D.D.S.
Dentistry

Albin R. Seidel, D.M.D.
Dentistry

John V. Taggart, M.D.
Medicine

Howard C. Taylor, Jr., M.D.
Obstetrics & Gynecology

Samuel F. Thomas, M.D.
Neurology

Sidney C. Werner, M.D.
Medicine

Arthur R. Wertheim, M.D.
Medicine

DeGraff Woodman, M.D.
Otolaryngology

Robert H. Wylie, M.D.
Surgery

Edward V. Zegarelli, D.D.S.
Dentistry

Anesthesiology

Director of Service
Henrik H. Bendixen, M.D.

Attending Anesthesiologists
Leonard Brand, M.D.
Mieczyslaw Finster, M.D.
Edgar C. Hanks, M.D.
Lester C. Mark, M.D.
Gabriel G. Nahas, M.D.
Shih-Hsun Ngai, M.D.
Ernest Salanitre, M.D.

Associate Attending Anesthesiologists
Allen I. Hyman, M.D.
Hoshang J. Khambatta, M.D.
Richard S. Matteo, M.D.
Eugene J. Pantuck, M.D.
Hilda Pedersen, M.D.
J. Gilbert Stone, M.D.
Lubos Triner, M.D.
Jen Tien Wung, M.D.

Assistant Attending Anesthesiologists
Jeffrey Askanazi, M.D.
Mary A. Becker, M.D.
Keith Bernstein, M.D.
Dorothy A. Black, M.D.
Donald G. Bluh, M.D.
Donald C. Brody, M.D.
Richard Y. Chen, M.D.
Arvin H. Chin, M.D.
Kathryn Ann Cozine, M.D.
Michael C. Damask, M.D.
Ellise S. Delphin, M.D.
Stephanie M. Duberman, M.D.
Alber N. Faltas, M.D.
Foun C. Fan, M.D.
Arthur D. Finck, M.D.
Ingrid A. Fitz-James, M.D.
Geordie Grant, M.D.
Carolyn P. Greenberg, M.D.
Warren K. Grodin, M.D.
John W. Hennessey, M.D.
Vance Lauderdale Jr., M.D.
Ina G. Lieberman, M.D.
Chi-Man Lo, M.D.
Laurence P. Mark, M.D.
Patricia J. Martin, M.D.
Samantha Mullis, M.D.
William M. Ollinger, M.D.
Eugene Ornestein, M.D.
Nancy M. Paetzold, M.D.
Leila M. Pang, M.D.
Richard K. Raker, M.D.
David M. Richlin, M.D.
Stanley H. Rosenbaum, M.D.
Peter L. Salgo, M.D.
Kevin V. Sanborn, M.D.
Alan Santos, M.D.
Jeffrey A. Sherman, M.D.
Medhat R. Wassef, M.D.
Gerald S. Weinberger, M.D.
Stephen M. Weitzman, M.D.
Sook Young Woo, M.D.
Howard Wulfson, M.D.
Joseph C-S. Yang, M.D.

Assistant Anesthesiologists
William W. Backus, M.D.
Darrell J. Goode, M.D.
Charles Weissman, M.D.

Full Professional Anesthesiologist
Alvin Wald, Ph.D.

Assistant Professional Anesthesiologist
Robert H. Dworkin, Ph.D.

Dentistry

Director of Service
Allan J. Formicola, D.D.S.

Attending Dentists
Edward A. Cain, D.D.S.
Nicholas A. DiSalvo, D.D.S.
Solon A. Ellison, D.D.S.
Robert Gottsegen, D.D.S.
Sidney L. Horowitz, D.D.S.
Mortimer Karmiol, D.D.S.
Austin H. Kutscher, D.D.S.
Joseph Leavitt, D.D.S.
John K. Lind, D.D.S.
John J. Lucca, D.D.S.
Irwin D. Mandel, D.D.S.
Louis Mandel, D.D.S.
Michael Z. Marder, D.D.S.
George A. Minervini, D.D.S.
Melvin L. Moss, D.D.S.
Henry I. Nahoum, D.D.S.
Irving J. Naidorf, D.D.S.
Julius Tarshis, D.D.S.

Associate Attending Dentists
Harold Baurmash, D.D.S.
Sebastian A. Bruno, D.D.S.
Stanislaw H. Brzustowicz, D.D.S.
Victor S. Caronia, D.D.S.
Kourken A. Daglian, D.D.S.
John E. Hutton, D.D.S.
David Kaplan, D.D.S.
Frances Karlan, D.D.S.
Joseph J. Marbach, D.D.S.
Melvin L. Morris, D.D.S.
John D. Piro, D.D.S.
Steven M. Roser, M.D., D.M.D.
Fred Rothenberg, D.D.S.
Robert N. Schiff, D.D.S.
Daniel D. Schube, D.D.S.
Murray Schwartz, D.D.S.
Steven S. Scrivani, D.D.S.
Boaz M. Shattan, D.D.S.
Ennio L. Uccellani, D.D.S.
Stephen Wotman, D.D.S.
David J. Zegarelli, D.D.S.

Assistant Attending Dentists
Jacob Abelson, D.D.S.
Jerome Bartwink, D.D.S.
Mitchell L. Beck, D.D.S.
Martin H. Blitzer, D.D.S.
Dory Calev, D.D.S.
Thomas J. Cangialosi, D.D.S.
John I. Cardillo, D.D.S.
Thomas J. Cleary, D.D.S.
Donald F. Cohen, D.D.S.
Mark S. Cohen, D.D.S.
Louis Colacicco, D.D.S.
Martin J. Davis, D.D.S.
Joseph A. DeJulia, D.D.S.
Gerald M. Drew, D.D.S.
Stella S. Efstratiadis, D.D.S.
Armando R. Fernandez, D.D.S.
Daniel Fine, D.D.S.
Robert Gabriele, D.D.S.
Steven J. Goldberg, D.D.S.
Robert S. Goldman, D.D.S.
Alvin J. Grayson, D.D.S.
Heidi Hills-Smith, D.D.S.
Ian Y. Hu, D.D.S.
Howard A. Israel, D.D.S.
Paul R. Kamen, D.D.S.
Syngcuk Kim, D.D.S.

Robert A. Koweek, D.D.S.
David M. Kritchman, D.D.S.
Eugene P. LaSota, D.D.S.
Lawrence Marder, D.D.S.
Guy D. Metcalf, D.D.S.
Dennis N. Morea, D.D.S.
Ronnie Myers, D.D.S.
Herbert Ostreicher, D.D.S.
Paul N. Rogow, D.D.S.
Mark A. Rosenblum, D.M.D.
Louis J. Rubins, D.D.S.
Milton Silver, D.D.S.
Morton J. Stern, D.D.S.
Robert N. Stuchell, D.D.S.
Mark A. Tepper, D.D.S.
Dante Torres, D.D.S.
John R. Varoscak, D.D.S.
Nicholas Vero, D.D.S.
Bertram J. Weissman, D.D.S.
Maxwell Widrow, D.D.S.
Jerome A. Zane, D.D.S.
Albert N. Zengo, D.D.S.

Assistant Dentists
Todd J. Berman, D.D.S.
Michael Goldberg, D.D.S.
Claudia Kaplan, D.D.S.
Gary W. Stern, D.D.S.

Dermatology

Director of Service
Leonard C. Harber, M.D.

Attending Dermatologists
Irving Abrahams, M.D.
Richard L. Edelson, M.D.
Jack Eisert, M.D.
Saul L. Sanders, M.D.
Meyer H. Slatkin, M.D.
Richard A. Walzer, M.D.
Alexander W. Young, M.D.

Associate Attending Dermatologists
Marc E. Grossman, M.D.
Maureen B. Poh, M.D.
Robert R. Walther, M.D.

Assistant Attending Dermatologists
Alan D. Andrews, M.D.
Robert B. Armstrong, M.D.
William G. Atwood, M.D.
Vincent S. Beltrani, M.D.
Yehuda D. Eliezri, M.D.
Eric W. Herman, M.D.
Einar A. Juhlin, M.D.
Steven R. Kohn, M.D.
Theodore A. Labow, M.D.
Peter C. Lombardo, M.D.
Jack H. Rozen, M.D.
David N. Silvers, M.D.
Gregory L. Zalar, M.D.

Associate Dermatologists
Robert P. Feinstein, M.D.
Paul I. Schneiderman, M.D.
Harvey I. Weinberg, M.D.

Assistant Dermatologists
Robert M. Bernstein, M.D.
Timothy J. Corey, M.D.
William J. Cunningham, M.D.
Vincent A. DeLeo, M.D.
Leon K. Demar, M.D.
Ellen C. Fithian, M.D.
Cheryl S. Hutt, M.D.
Bruce Katz, M.D.
Jeffrey S. Kezis, M.D.
Stanley J. Lewis, M.D.
Joan P. Norotf, M.D.
Joseph A. Penner, M.D.
Douglas J. Pravda, M.D.
Margaret S. Ravits, M.D.
Kass Sadri, M.D.
Joseph S. Shapiro, M.D.
David Sibulkin, M.D.
Luis S. Suarez, M.D.
Eugene W. Sweeney, M.D.
Ellmore G. Thorne, M.D.
Ruth K. Treiber, M.D.
Steven Wolinsky, M.D.

Full Professional Dermatologist
Margarita Silva-Hunter, Ph.D.

Medicine

Director of Service
Robert M. Glickman, M.D.

Attending Physicians
Qais Al-Awqati, M.D.
Arthur Bank, M.D.
Hylan A. Bickerman, M.D.
J. Thomas Bigger Jr., M.D.
Vincent P. Butler, M.D.
Robert E. Canfield, M.D.
Paul J. Cannon, M.D.
Leonard Chess, M.D.
Nicholas P. Christy, M.D.
Stanley Cortell, M.D.
Felix E. Demartini, M.D.
John R. Edsall, M.D.
Rose R. Ellison, M.D.
Andrew G. Frantz, M.D.
DeWitt S. Goodman, M.D.
Donald A. Holub, M.D.
Israel A. Jaffe, M.D.
Edgar Leifer, M.D.
Robert I. Levy, M.D.
John Lindenbaum, M.D.
Robert Lindsay, M.D.
John N. Loeb, M.D.
Jay I. Meltzer, M.D.
Thomas Q. Morris, M.D.
Harold C. Neu, M.D.
Elliott F. Osserman, M.D.
Robert H. Palmer, M.D.
Richard N. Pierson Jr., M.D.
Henry G. Schaffeld, M.D.
Richard J. Stock, M.D.
Joseph G. Sweeting, M.D.
Donald F. Tapley, M.D.
Robert N. Taub, M.D.
Gerald E. Thomson, M.D.
I. Bernard Weinstein, M.D.
Robert T. Whitlock
John A. Wood, M.D.

Associate Attending Physicians
Richard P. Ames, M.D.
Leslie P. Baer, M.D.
C. Redington Barrett Jr., M.D.
John P. Bilezikian, M.D.
Ralph S. Blume, M.D.
John O. Burris, M.D.
Peter R. Caldwell, M.D.
Ronald E. Drusin, M.D.
Yale Enson, M.D.
Dorothy Estes, M.D.
Edward E. Fischel, M.D.
Glenda J. Garvey, M.D.
Elsa-Grace V. Giardina, M.D.
Lionel Grossbard, M.D.
Robert H. Heissenbuttel, M.D.
Wylie Hembree, M.D.
Peter R. Holt, M.D.
George A. Hyman, M.D.
Thomas P. Jacobs, M.D.
Karen L. Kaplan, M.D.
Abbie I. Knowlton, M.D.
Robert A. Kirtzler, M.D.
Marianne J. Legato, M.D.
William P. Lovejoy, M.D.
John M. McClement, M.D.
David J. McConnell, M.D.
George H. McCormack, M.D.
George W. Melcher Jr., M.D.
Jane H. Morse, M.D.
Hans W. Neuberg, M.D.
Michael F. Parry, M.D.
Gerald B. Phillips, M.D.
F. Xavier Pi-Sunyer, M.D.
James A. Reiffel, M.D.
Lawrence L. Scharer, M.D.
Eve E. Slater, M.D.
Frank R. Smith, M.D.
Jeffrey A. Stein, M.D.
Alan R. Tall, M.D.
Henry M. Thomas III, M.D.
Theodore B. Van Itallie, M.D.
Melvin B. Weiss, M.D.
Francis M. Weld, M.D.
Earl A. Wheaton, M.D.

Assistant Attending Physicians
Ronald D. Adelman, M.D.
Casco Alston, M.D.
Gerald B. Appel, M.D.
Alfred Becker, M.D.
John F. Bertles, M.D.
David K. Blood, M.D.
Conrad B. Blum, M.D.
Peter J. Buchin, M.D.
Gary R. Burke, M.D.
L. David Carmichael, M.D.
Rita A. Charon, M.D.
Herbert S. Chase Jr., M.D.
David J. Cohen, M.D.
Michael H. Cohen, M.D.
Randolph P. Cole, M.D.
James Coromilas, M.D.
Dennis Davidson, M.D.
Nicholas O. Davidson, M.D.
Robert H. DeBellis, M.D.
Richard B. Duane Jr., M.D.
Oliver T. Fein, M.D.
Kenneth C. Fine, M.D.
Steven M. Friedman, M.D.
Jerry I. Gliklich, M.D.
Ira J. Goldberg, M.D.
Mark J. Goldberger, M.D.
Steven Grant, M.D.
Peter Green, M.D.
Marc D. Grodman, M.D.
Richard Haber, M.D.
George C. Hennig, M.D.
Kung-Ming Jan, M.D.
Lynne L. Johnson, M.D.
Rima G. Kopelman, M.D.
Cheryl L. Kunis, M.D.
Rafael A. Lantigua, M.D.
Daniel L. Larson, M.D.
Oscar Lebwohl, M.D.
David S. Leibowitz, M.D.
Benjamin H. Lewis, M.D.
Arnold L. Lisio, M.D.
Frank D. Livelli Jr., M.D.
Daniel L. Macken, M.D.
Arthur M. Magun, M.D.
William M. Manger, M.D.
Aaron Manson, M.D.
David M. Margulies, M.D.
Robert J. McConnell, M.D.
J. Gregory Mears, M.D.
Robin O. Motz, M.D.
Marcia Naveh, M.D.
Alfred I. Neugut, M.D.
Allen B. Nichols, M.D.
Juan Oliver, M.D.
Carmen Ortiz-Neu, M.D.
Martin W. Oster, M.D.
John Owen, M.D.
Constance M. Park, M.D.
Marjorie Perloff, M.D.
John E. Postley Jr., M.D.
Eric R. Powers, M.D.
Kenneth M. Prager, M.D.
Marshall P. Primack, M.D.
Alice S. Prince, M.D.
Barrie L. Raik, M.D.
Nicholas Rango, M.D.
Frederick A. Rapoport, M.D.
Dennis S. Reison, M.D.
John L. Roglieri, M.D.
Mario F. Romagnoli, M.D.
Stanley H. Rosenbaum, M.D.
Stephen N. Rosenberg, M.D.
Lewis P. Schneider, M.D.
Harvey A. Schneier, M.D.
Peter E. Schrag, M.D.
Allan Schwartz, M.D.
Alan H. Seplowitz, M.D.
Elizabeth J. Shane, M.D.
William H. Sherman, M.D.
Richard V. Sims III, M.D.
Ethel S. Siris, M.D.
Marjorie C. Slankard, M.D.
Arthur I. Snyder, M.D.
Alfred Steiner, M.D.
Kenneth Sterling, M.D.
David M. Stern, M.D.
Leonard Stern, M.D.
Mark B. Stoopler, M.D.
Joseph Tenenbaum, M.D.
Byron M. Thomashow, M.D.
Cornelius J. Tyson, M.D.
Sharon Wardlaw, M.D.
Charles Weissman, M.D.
Jack B. Weissman, M.D.
Jeffrey I. Weitz, M.D.
Gail S. Williams, M.D.
Chun K. Yip, M.D.

Associate Physicians
Marcia B. Bull, M.D.
Jonas M. Goldstone, M.D.
Robert Lewy, M.D.

Assistant Physicians
Howard J. Barnum, M.D.
Kapil N. Bhalla, M.D.
David N. Burns, M.D.
Jorge L. Cortes-Quinones, M.D.
Arthur R. DeSimone, M.D.
Edward Eden, M.D.

Juan G. Edreira, M.D.
Kevin J. Ferrick, M.D.
Michael Goldman, M.D.
Susan M. Goodman, M.D.
Lonnie B. Hanauer, M.D.
Joseph Heller, M.D.
Ralph Herz Jr., M.D.
Nancy F. Kahn, M.D.
Alan L. Kalischer, M.D.
Thomas R. Kleyman, M.D.
Gregory F. Klomp, M.D.
Judith S. Levinson, M.D.
Laureano Lopez-Garrido, M.D.
Pier L. Mancusi-Ungaro, M.D.
Mato L. Marinovich, M.D.
John E. McWhorter, M.D.
Clayton L. Natta, M.D.
Connie B. Newman, M.D.
Anthony L. Pucillo, M.D.
Milovan T. Rakic, M.D.
Morris R. Rapoport, M.D.
Zandra Rios-Rivera, M.D.
John M. Rodgers, M.D.
Robert B. Roven, M.D.
Richard H. Runser, M.D.
Alan L. Saroff, M.D.
Larry L. Schulman, M.D.
Brian E. Scully, M.D.
Jane S. Sillman, M.D.
Susan Steinberg, M.D.
Jane E. Stone, M.D.
Adele C. Tedeschi, M.D.
Natalie J. Warner, M.D.
Christine Weart, M.D.
John M. Zimmerman, M.D.

Full Professional Physicians
William P. Jacobs, D.P.M
Bernard Rosenstein, D.P.M.
Harold H. Whitney, D.P.M.

Microbiology

Associate Attending Microbiologist
Katherine Sprunt, M.D.

Full Professional Microbiologists
Paul D. Ellner, Ph.D.
Elvin Kabat, Ph.D.

Neurological Surgery

Director of Service
Bennett M. Stein, M.D.

Attending Neurological Surgeons
James W. Correll, M.D.
Edgar M. Housepian, M.D.

Associate Attending Neurological Surgeons
Joao Lobo Antunes, M.D.
Peter W. Carmel, M.D.
James G. McMurtry, III, M.D.
W. Jost Michelsen, M.D.
Kalmon D. Post, M.D.
Donald O. Quest, M.D.

Assistant Attending Neurological Surgeon
Ronald Brisman, M.D.

Neurology

Director of Service
Lewis P. Rowland, M.D.

Attending Neurologists
Carl W. Braun, M.D.
John C. M. Brust, Jr., M.D.
Abe M. Chutorian, M.D.
Darryl DeVivo, M.D.
Stanley Fahn, M.D.
Arnold P. Gold, M.D.
James F. Hammill, M.D.
Robert E. Lovelace, M.D.
Neils L. Low, M.D.
Jay P. Mohr, M.D.
Timothy A. Pedley, M.D.
Audrey S. Penn, M.D.
Daniel Sciarra, M.D.
Earl A. Zimmerman, M.D.

Associate Attending Neurologists
Robert E. Barrett, M.D.
Lucien J. Cote, M.D.
Robert A. deNapoli, M.D.
W. Allen Hauser, M.D.
Edward B. Healton, M.D.
William G. Johnson, M.D.
Stanley Lesse, M.D.
Linda D. Lewis, M.D.
Joseph L. O'Brien, M.D.
C. Dominique Toran-Allerand, M.D.
Hyman G. Weitzen, M.D.

Assistant Attending Neurologists
Gary Abrams, M.D.
Alfred C. Bannerman, M.D.
Frank K. Boschenstein, M.D.
Bertel Bruun, M.D.
Robert E. Burke, M.D.
Sidney M. Cohen, M.D.
James F. Culleton, M.D.
Arnold E. Eggers, M.D.
Ronald G. Emerson, M.D.
Robert A. Esser, M.D.
Michael R. Fetell, M.D.
Matthew E. Fink, M.D.
Eugenia T. Gamboa, M.D.
Mark W. Green, M.D.
Stanley B. Holstein, M.D.
Ram Kairam, M.D.
Norman Latov, M.D.
Theodore A. List, M.D.
Richard P. Mayeux, M.D.
James R. Miller, M.D.
Gajanan Nilaver, M.D.
Marcelo R. Olarte, M.D.
Charles R. Plank, M.D.
Jerome S. Resnick, M.D.
Stanley R. Resor, M.D.
Kuldip K. Sachdev, M.D.
Roger D. Traub, M.D.
Joseph H. Willner, M.D.

Associate Neurologists
Bruce J. Fisch, M.D.
Joyce Ilson, M.D.
Bruce Roseman, M.D.
Robert R. Wolff, M.D.

Assistant Neurologists
Susan B. Bressman, M.D.
Louise A. Donohoe, M.D.
Damon M. Fellman, M.D.
Michael L. Gruber, M D.
Stephen C. Klass, M.D.
Dale J. Lange, M.D.

Stanley L. Malkin, M.D.
Gerald Smallberg, M.D.

Full Professional Neurologists
Giuliana Galassi, Ph.D.
Werner Trojaborg, Ph.D.

Obstetrics/Gynecology

Acting Director of Service
Allan G. Rosenfield, M.D.

Associate Director of Service
W. Duane Todd, M.D.

Attending Obstetricians & Gynecologists
Solan Chao, M.D.
Henry Clay Frick, II, M.D.
Georgiana Jagiello, M.D.
Orlando J. Miller, M.D.
Equinn W. Munnell, M.D.
Robert S. Neuwirth, M.D.

Associate Attending Obstetricians & Gynecologists
Bruce A. Barron, M.D.
Edward T. Bowe, M.D.
Harold E. Fox, M.D.
Vincent J. Freda, M.D.
Raphael Jewelewicz, M.D.
Jack E. Maidman, M.D.
Raymond M. McCaffrey, M.D.
David B. Moore, M.D.
Roy H. Petrie, M.D.
Abraham Risk, M.D.
Sidney J. Siegel, M.D.
Gilbert J. Vosburgh, M.D.
Ming-Neng Yeh, M.D.

Assistant Attending Obstetricians & Gynecologists
Laxmi V. Baxi, M.D.
Deborah J. Hales, M.D.
Nabil Husami, M.D.
John M. Hutson, M.D.
Phyllis Leppert, M.D.
Richard U. Levine, M.D.
Andrew Loucopoulos, M.D.
Keith F. Rawlinson, M.D.
Kevin B. Reilly, M.D.
David L. Rosenfeld, M.D.
Haider H. Shamsi, M.D.
Jen-Ta Shen, M.D.
Meredith Sirmans, M.D.
Harold Speert, M.D.
Wolfgang Tretter, M.D.
Pamela J. Tropper, M.D.

Associate Obstetricians & Gynecologists
Elynne B. Margulis, M.D.
Lawrence J. Severino, M.D.

Assistant Obstetricians & Gynecologists
Hussein K. Amin, M.D.
Ina Cholst, M.D.
Steven G. Kaali, M.D.
Amalia C. Kelly, M.D.
Kevin D. Reilly, M.D.
Malca Sane, M.D.
Varsha K. Saraf, M.D.
Elizabeth P. Schneider, M.D.
Henry A. Sellner, M.D.
Barbara E. Shortle, M.D.
Steven Swersky, M.D.
Leonardo J. Yunis. M.D.

Ophthalmology

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Peter Gouras, M.D.
Ira Snow Jones, M.D.
Philip Knapp, M.D.
Harold F. Spalter, M.D.

Associate Attending Ophthalmologists
Myles M. Behrens, M.D.
William C. Cooper, M.D.
Richard W. Darrell, M.D.
Andrew DeRoetth Jr., M.D.
John W. Espy, M.D.
R. Linsy Farris, M.D.
Max Forbes, M.D.
Frank B. Hoefle, M.D.
George M. Howard, M.D.
Francis A. L'Esperance, M.D.
Balachandran D. Srinivasan, M.D.
Stephen L. Trokel, M.D.
Howard M. Eggers, M.D.
Arnold W. Forrest, M.D.
Hugh M. Moss, M.D.
Ellen F. Regan, M.D.
Hampson A. Sisler, M.D.
Emil Wirostko, M.D.

Associate Ophthalmologists
Albert J. Hofeldt, M.D.
William A. James, M.D.
Rainer N. Mittl, M.D.

Assistant Ophthalmologists
Rajendra K. Bansal, M.D.
Richard D. Banyard, M.D.
Lisa G. Barbera, M.D.
Arthur M. Cotliar, M.D.
Pamela F. Gallin, M.D.
Donald H. Green, M.D.
Martin L. Leib, M.D.
Richard G. Lennon, M.D.
Cynthia J. MacKay, M.D.
John C. Merriam, M.D.
Lawrence G. Pape, M.D.
Louis D. Pizzarello
Lance D. Redler, M.D.
Jaime Santamaria II, M.D.
Mark D. Stern, M.D.
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Orthopedic Surgery

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David L. Andrews, M.D.
Nas S. Eftekhar, M.D.
S. Ashby Grantham, M.D.
Charles S. Neer, II, M.D.

Associate Attending Orthopedic Surgeons
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Rosamond Kane, M.D.
Hugo A. Keim, M.D.
Raphael K. Levine, M.D.
Keith D. McElroy, M.D.
Marvin L. Shelton, M.D.

Assistant Attending Orthopedic Surgeons
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Howard A. Kiernan, M.D.
Christopher B. Michelsen, M.D.
James C. Parkes II, M.D.
Andrew H. Patterson, M.D.
Robert M. Reiss, M.D.
Martin L. Sorger, M.D.
James N. Worcester Jr., M.D.

Assistant Orthopedic Surgeons
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Louis U. Bigliani, M.D.
Robert L. Boothe, M.D.
Michael J. Bronson, M.D.
Peter N. Carbonara, M.D.
William U. Cavallaro, M.D.
Robert N. Dunn, M.D.
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Charles B. Goodwin, M.D.
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Lawrence A. Lefkowitz, M.D.
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Harvey Orlin, M.D.
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Thomas D. Rodda, M.D.
Melvin P. Rosenwasser, M.D.
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Hervey S. Sicherman, M.D.
David M. Smith, M.D.
Ronald Tietjen, M.D.
Luther F. Warren, M.D.
Joel D. Weinstein, M.D.

Otolaryngology

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Attending Otolaryngologist
Robert M. Hui, M.D.

Associate Attending Otolaryngologists
Andrew Blitzer, M.D.
Frank V. Mignogna, M.D.
Steven M. Roser, M.D.
Lawrence Savetsky, M.D.
Malcolm H. Schvey, M.D.

Assistant Attending Otolaryngologists
Soly Baredes, M.D.
Hyun T. Cho, M.D.
Lee D. Eisenberg, M.D.
Kenneth F. Garay, M.D.
Anthony F. Jahn, M.D.
Raymond B. Strauss

Assistant Otolaryngologists
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Anthony P. Caruso, M.D.
Vincent G. Caruso, M.D.
Allan L. Jacobson, M.D.
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Nicholas D. Pontilena, M.D.
William J. Richtsmeier, M.D.
David S. Schuster, M.D.
Peter D. Westerhoff, M.D.

Pathology

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Gabriel C. Godman, M.D.
Austin D. Johnston, M.D.
Luciano Ozzello, M.D.
Karl H. Perzin, M.D.
Conrad L. Pirani, M.D.
Ralph M. Richart, M.D.

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Thomas A. Blumenfeld, M.D.
Richard F. Defendini, M.D.
John J. Fenoglio, M.D.
Ricardo Mesa-Tejada, M.D.
H. Joachim Wigger, M.D.

Assistant Attending Pathologists
James H. Brassel, M.D.
Jerome Owen Cantor, M.D.
Christopher P. Crum, M.D.
Daniel J. Fink, M.D.
Margaret M. Grimes, M.D.
Arthur P. Hays, M.D.
Jay H. Lefkowitch, M.D.
Charles C. Marboe, M.D.
Merlin D. Marquardt, M.D.

Assistant Pathologists
Kathleen M. O'Toole, M.D.
May Parisien, M.D.
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Pediatrics

Director of Service
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Louis Z. Cooper, M.D.
Nicholas Cunningham, M.D.
Ralph B. Dell, M.D.
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Sylvia P. Griffiths, M.D.
Jerry C. Jacobs, M.D.
L. Stanley James, M.D.
Erich J. Kahn, M.D.
Robert B. Mellins, M.D.
Sergio Piomelli, M.D.
Michael R. Rosen, M.D.
Anneliese L. Sitarz, M.D.
Myron Winick, M.D.

Associate Attending Pediatricians
Fred A. Agre, M.D.
Robert E. Appleby, M.D.
Russell S. Asnes, M.D.
Stephen J. Atwood, M.D.
William A. Bauman, M.D.
Jennifer J. Bell, M.D.
Frederick M. Bomback, M.D.
Solomon J. Cohen, M.D.
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Ehud Krongrad, M.D.
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Martin A. Nash, M.D.
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Tove S. Rosen, M.D.
Gloria O. Schrager, M.D.
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Joseph A. Silverman, M.D.
Katherine Sprunt, M.D.
Samuel A. Stalcup, M.D.
Carl N. Steeg, M.D.
Stephen F. Wang, M.D.
Doris L. Wethers, M.D.
Philip R. Ziring, M.D.

Assistant Attending Pediatricians
Dennis J. Allendorf, M.D.
Rose G. Ames, M.D.
Robert Antar, M.D.
Kwame Anyane-Yeboa, M.D.
Robyn J. Barst, M.D.
Fredrick Bierman, M.D.
Alexander Blum Jr., M.D.
Vincent R. Bonagura, M.D.
Matilda B. Brust, M.D.
Roger S. Challop, M.D.
Catherine M. Driscoll, M.D.
Yvonne T. Driscoll, M.D.
T. Donald Eisenstein, M.D.
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Bernard R. Feldman, M.D.
Charles H. Feldman, M.D.
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Marguerite J. Gates, M.D.
Gustave Gavis, M.D.
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Burton Grebin, M.D.
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Roderick C. Richards, M.D.
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Boris Rubinstein, M.D.
Ulana M. Sanocka, M.D.
Karl F. Schulze, M.D.
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Raymond L. Stark, M.D.
Harold Starkman, M.D.
David Stiles, M.D.
Lucy H. Swift, M.D.
Sten H. Vermund, M.D.
Martin B. Vita, M.D.
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David H. Wisotsky, M.D.

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Bruce Beeber, M.D.
William J. Chernack, M.D.
Lilian W. Chiu, M.D.
Maryann J. Colenda, M.D.
John L. Costa, M.D.
Robert A. Hands, M.D.
Alan I. Kanter, M.D.
Kusum Khanna, M.D.
Elaine C. Lee, M.D.
Judith E. Luskin, M.D.
Peter F. Migel, M.D.

Assistant Pediatricians
Martha L. Amarant, M.D.
Alia Bazzy-Asaad, M.D.
Dennis A. Brown, M.D.
Kuang-Chung Hu Chien, M.D.
Kathryn A. Crowley, M.D.
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Leslie L. Davidson, M.D.
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Marie B. Keith, M.D.
Eitan S. Kilchevsky, M.D.
Rosemary E. Klenk, M.D.
Eli Koenig, M.D.
Michael L. Lapkin, M.D.
Dorothy A. Levine, M.D.
Gaines M. Mimms, M.D.
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Rolalinda Rubinstein, M.D.
Morton J. Seligman, M.D.
D. Loren Southern, M.D.
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Mary G. Versefelt, M.D.
Samuel M. Willinger, M.D.
Samuel T. Wilmit, M.D.
Paul B. Yellin, M.D.
Tova G. Yellin, M.D.

Pharmacology

Full Professional Pharmacologist
Brian F. Hoffman, M.D.

Psychiatry

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James L. Curtis, M.D.
Richard G. Druss, M.D.
Harlow D. Dunton, M.D.
Ronald R. Fieve, M.D.
Archie R. Foley, M.D.
Richard A. Gardner, M.D.
Lothar Gidro-Frank, M.D.
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Murray Glusman, M.D.
Joseph Jaffe, M.D.
Eric R. Kandel, M.D.
Clarice J. Kestenbaum, M.D.
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Roger Mac Kinnon, M.D.
John D. Rainer, M.D.
James H. Ryan, M.D.
David Shaffer, M.D.
Robert L. Spitzer, M.D.

Associate Attending Psychiatrists
Miron Baron, M.D.
Clemens C. Beels, M.D.
Anne E. Bernstein, M.D.
Rodman Gilder Jr., M.D.
Arthur Green, M.D.
Stanley S. Heller, M.D.
Winslow R. Hunt, M.D.
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Eric R. Marcus, M.D.
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Helen C. Meyers, M.D.
John F. O'Connor, M.D.
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Joaquim Puig-Antich, M.D.
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Henry I. Spitz, M.D.
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Stuart C. Yudofsky, M.D.

Assistant Attending Psychiatrists
Harry D. Albert, M.D.
Carmen M. Alonso, M.D.
Stan D. Arkow, M.D.
Morton J. Aronson, M.D.
John A. Atchley, M.D.
Athanasia Balkoura, M.D.
Leah Beck, M.D.
Robinette N. Bell, M.D.
Stephen L. Bennett, M.D.
Raymond Bernick, M.D.
Stanley Bone, M.D.
Edward N. Brennan, M.D.
Paul F. Califano, M.D.
Ian A. Canino, M.D.
William J. Chambers, M.D.
Harvey R. Chertoff, M.D.
Irene Chiarandini, M.D.
Frances B. Cohen, M.D.
Francine Cournos, M.D.
Barbara H. De Betz, M.D.
Paolo Decina, M.D.
Zira De Fries, M.D.
Richard A. Dickes, M.D.
Nathaniel Donson, M.D.
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Charles F. Entelis, M.D.
Jerry B. Finkel, M.D.
Bruce M. Forester, M.D.
Eugene A. Friedberg, M.D.
Abby Fyer, M.D.
Bimalendu Ganguly, M.D.
Lee R. Gardner, M.D.
Iona H. Ginsberg, M.D.
Ana B. Glick, M.D.
Robert A. Glick, M.D.
Edwin A. Goldstein, M.D.
Jack M. Gorman, M.D.
Gary J. Grad, M.D.
Laurence L. Greenhill, M.D.
Kenneth Greenspan, M.D.
Lloyd A. Hamilton, M.D.
Harvey M. Hammer, M.D.
Wilma M. Harrison, M.D.
Michelle L. Hirsch, M.D.
Joel S. Hoffman, M.D.
Steven E. Hyler, M.D.
David Jaffe, M.D.
Lila J. Kalinich, M.D.
Shepard J. Kantor, M.D.
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Peter Laderman, M.D.
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David B. Leibow, M.D.
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Laurence S. Lorefice, M.D.
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William R. Mc Farlene Jr., M.D.
Patrick J. Mc Grath Jr., M.D.
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Jean K. Miller, M.D.
Robert S. Mumford, M.D.
Philip R. Muskin, M.D.
Joseph C. Napoli, M.D.
Jaime P. Nos, M.D.
David D. Olds, M.D.
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David Peretz, M.D.
Jeffrey M. Pines, M.D.
Harry R. Potter, M.D.
Leslie L. Powers, M.D.
Kathryn F. Prescott, M.D.
Steven P. Roose, M.D.
Lyle E. Rosnick, M.D.
Boris Rubinstein, M.D.
Morton B. Sarlin, M.D.
Eleanor S. Schuker, M.D.
Irene B. Seeland, M.D.
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Charles Siegal, M.D.
Andrew E. Skodol II, M.D.
Frieda H. Spady, M.D.
Jonathan W. Stewart, M.D.
Diane E. Stone, M.D.
B. Timothy Walsh, M.D.
Josef H. Weissberg, M.D.
Beth E. Yudofsky, M.D.

Associate Psychiatrists
Donald C. Bell, M.D.
Ivan K. Goldberg, M.D.
Gurston D. Goldin, M.D.
Arthur R. Jacobs, M.D.
Naomi Leiter, M.D.
Virginia Lozzi, M.D.
Phyllis B. Robbins, M.D.
Barbara R. Rosenfeld, M.D.
George Satran, M.D.
Gerda H. Strika, M.D.
Hector O. Varas, M.D.

Assistant Psychiatrists
Geary E. Ahearn, M.D.
Paul J. Ambrosini, M.D.
John J. Barsa, M.D.
A. Alexis Brosen, M.D.
Sydney C. Bush, M.D.
Leon Chattah, M.D.
Daniel E. Cohen, M.D.
Dominick Di Fabio, M.D.
Jennifer I. Downey, M.D.
Paula Eagle, M.D.
Katherine Falk, M.D.
Sylvia M. Furstenberg, M.D.
Rosalie Greenberg, M.D.
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Ewald Horwath, M.D.
Sonia W. Hyman, M.D.
Wynn K. Jackson, M.D.
Stanislaw P. Jonas, M.D.
David A. Kahn, M.D.
Jeffrey P. Kahn, M.D.
Andres N. Kanner, M.D.
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Robert Kertzner, M.D.
Harold Koplewicz, M.D.
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Alan M. Levy, M.D.
Erica M. Loutsch, M.D.
Robert D. Mc Mullen, M.D.
Reed C. Moskowitz, M.D.
Patricio Paez, M.D.
Harris Rabinovich, M.D.
Jeffrey S. Rosecan, M.D.
Franklin D. Russek, M.D.
Neal D. Ryan, M.D.
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David P. Schiebel, M.D.
Karl J. Schroeder, M.D.
Jonathan R. Schwartz, M.D.
Beth J. Seelig, M.D.
Jonathan M. Silver, M.D.
H. David Stein, M.D.
Gloria Stern, M.D.
Laurie A. Stevens, M.D.
Rafael Tavares, M.D.
Paul D. Trautman, M.D.

Full Professional Psychiatrists
Anke Ehrhardt, Ph,D.
Heino F. Meyer-Bahlburg, Ph.D.

Assistant Professional Psychiatrists
Susan P. Brinkworth, Ph.D.
Irwin Mansdorf Ph.D.
Gail A. Wasserman Ph.D.

Associate Professional Psychiatrist
Richard Sauber Ph.D.

Public Health

Attending
Michael Katz, M.D.

Full Professional
Dickson D. Despommier, Ph.D.
Joseph L. Fleiss, Ph.D.

Radiology

Director of Service
David H. Baker, M.D.

Attending Radiologists
Philip O. Alderson, M.D.
Walter E. Berdon, M.D.
Chu H. Chang, M.D.
Kent Ellis, M.D.
Frieda Feldman, M.D.
Sadek Hilal, M.D.
Donald L. King, M.D.
Eric C. Martin, M.D.
Ralph Schlaeger, M.D.
William B. Seaman, M.D.

Associate Attending Radiologists
Thane Asch, M.D.
John Austin, M.D.
Joan Eliasoph, M.D.
Rashid Fawwaz, M.D.
Karen S. Fountain, M.D.
Monique C. Katz, M.D.
Kevin L. Macken, M.D.
Jeffrey H. Newhouse, M.D.
Paul Sane, M.D.
Alan J. Silver, M.D.

Assistant Attending Radiologists
Sara Abramson, M.D.
Kaaren N. Bergquist, M.D.
Elliott Fankuchen, M.D.
Susan J. Frank, M.D.
Karen J. Laffey, M.D.
Arthur Liskow, M.D.
Herman Lubetsky, M.D.
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Elizabeth O'Connell, M.D.
Ahalya Premkumar, M.D.
Joel Rosen, M.D.
David W. Seldin, M.D.
Lorraine G. Shapeero, M.D.
Robert E. Sibley, M.D.
Ellen Silverstein, M.D.
Rolando D. Singson, M.D.

Assistant Radiologists
Alfred G. Gladstone, M.D.
David C. Grant, M.D.
Pearl Herskovitz, M.D.
Madhuri Kirpekar, M.D.
Steven A. Kroop, M.D.
Charles F. Lanzieri, M.D.
Daniel S. Levy, M.D.
Michael J. Marchese, M.D.
Thomas Moore, M.D.
Jeanne Schwartz, M.D.
Philip Silverberg, M.D.
Richard H. Taus, M.D.

Full Professional Radiologists
Peter D. Esser, Ph.D.
Eric J. Hall, Ph.D.
Edward L. Nickoloff, Sc.D.
Richard J. Riley, Ph.D.
Harold H. Rossi, Ph.D.
Lawrence A. Shepp, Ph.D.
Theodore Wang, Ph.D.

Assistant Professional Radiologist
Seong Ki Mun, Ph.D.

Rehabilitation Medicine

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Stanley J. Myers, M.D.

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Arun K. Bhattacharyya, M.D.
Antonio Cocchiarella, M.D.
Caroline O. McCagg, M.D.
Damyanti G. Moorjani, M.D.
Anthony V. Porcelli, M.D.
Naomi L. Turner, M.D.

Associate Rehabilitation Physicians
Ann Breuer, M.D.
Howard Liss, M.D.
Lucille Tsu Pai, M.D.

Assistant Rehabilitation Physicians
Yasoma B. Challenor, M.D.
Francis J. Foca, M.D.
Michael Hajdu, M.D.
Donald Liss, M.D.
John T. Raftis III, M.D.
Herbert L. Thornhill, M.D.

Full Professional Rehabilitation Physician
Peter D. Natalie, Ph.D.

Surgery

Director of Service
Keith Reemtsma, M.D.

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Kenneth A. Forde, M.D.
Frank E. Gump, M.D.
Mark A. Hardy, M.D.
Frederic P. Herter, M.D.
Thomas C. King, M.D.
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John B. Price Jr., M.D.
Arthur B. Voorhees, M.D.
Bashir A. Zikria, M.D.

Associate Attending Surgeons
Robert G. Bertsch, M.D.
Joseph A. Buda, M.D.
David M. Carberry, M.D.
Carl R. Feind, M.D.
Charles W. Findlay, M.D.
Harold P. Freeman, M.D.
Ivo P. Janecka, M.D.
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David M. Ju, M.D.
Sven J. Kister, M.D.
Paul Lo Gerfo, M.D.
George C. Peck, M.D.
John N. Schullinger, M.D.
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